Robin Generator

Model RGD2500/RGD3300

ISSUE EMD-GS0604

Technical Data & Overhaul Instructions

SERVICE MANUAL

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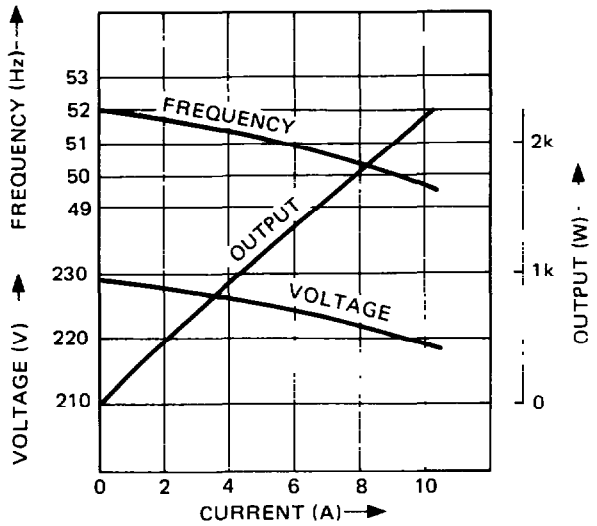
			RGD2500				RGD3300			
ALTERNATOR	Type		Brushless, Revolving Field, Self-Exciting, 2-Pole, Single Phase							
	AC	Frequency	50Hz		60Hz		50Hz		60Hz	
		Maximum Output	2300W		2500W		3000W		3300W	
		Rated Output	2000W		2200W		2700W		3000W	
		Voltage Rated	110V	18.2A	110V	20.0A	110V	24.6A	110V	27.3A
			220V	9.1A	120V	18.3A	220V	12.3A	120V	25.0A
			240V	8.3A	220V	9.2A	240V	11.3A	220V	12.5A
		Current	110V/220V	18.2A/9.1A	110V/220V	20.0A/10.0A	110V/220V	24.6A/12.3A	110V/220V	27.3A/13.6A
			–	–	120V/240V	18.3A/9.2A	–	–	120V/240V	25.0A/12.5A
		Power Factor	1.0							
	DC Output		12V-8.3A (100W)							
	Voltage Regulator		Condenser Type							
	Voltage Regulation		Within 10%							
ENGINE	Type		Air-cooled, 4 cycle, Diesel engine							
	Model		DY23D				DY27D			
	Displacement		230 cc (14.04 cu.in.)				265 cc (16.17 cu.in.)			
	Rated Output		4.3 PS/3000 rpm		4.8 PS/3600 rpm		5.0 PS/3000 rpm		5.5 PS/3600 rpm	
	Fuel		Diesel Light Oil							
	Fuel Tank Capacity		7.8 liters (2.1 U.S. gal.)							
	Fuel Consumption Ratio (at Rated Output)		50 Hz: 0.93 liters/hour 60 Hz: 1.10 liters/hour				50 Hz: 1.18 liters/hour 60 Hz: 1.30 liters/hour			
	Oil Capacity		0.9 liters							
	Starting System		Recoil Starter and Optional Electric Starter							
Dimensions L x W x H		Recoil start	536 x 400 x 458 mm (21.1 x 15.8 x 18.0 in.)							
		Electric start	709 x 400 x 458 mm (27.9 x 15.8 x 18.0 in.)							
Dry Weight		Recoil start	55 kg (121 lbs.)				58.5 kg (129 lbs.)			
		Electric start	58.5 kg (129 lbs.)				62 kg (137 lbs.)			

Specifications are subject to change without notice.

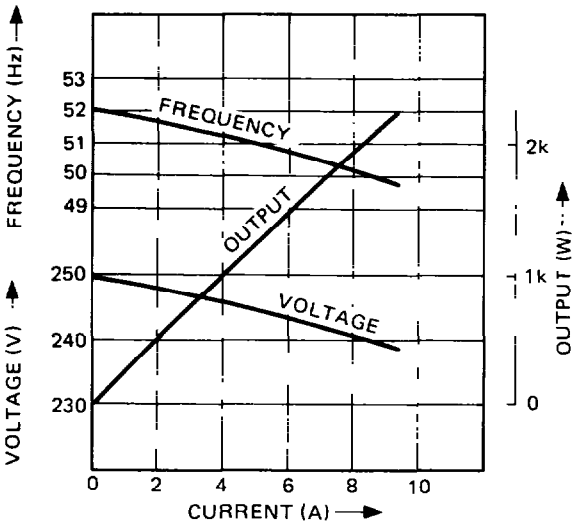
2. PERFORMANCE CURVES

2-1 MODEL RGD2500



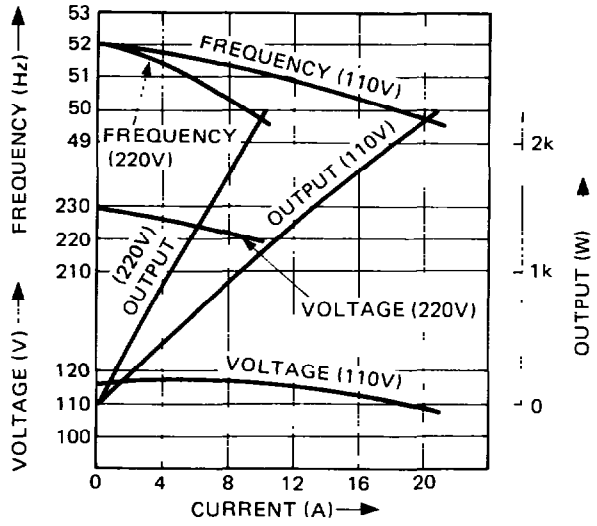
RGD2500

Output Max.	2200W
Rated	2000W
Frequency	50Hz
Voltage	220V



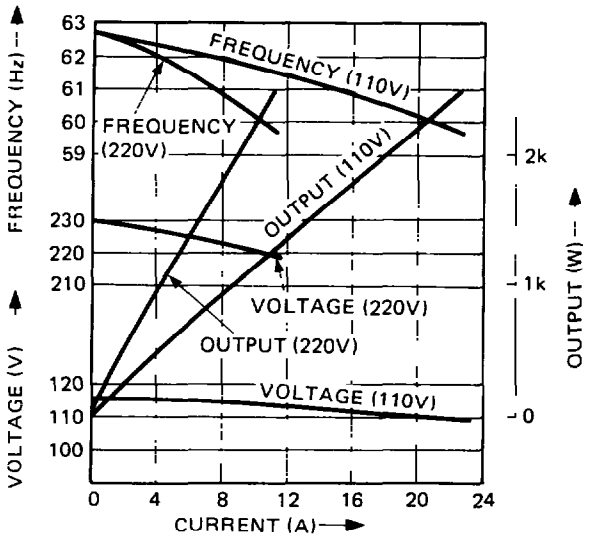
RGD2500

Output Max.	2200W
Rated	2000W
Frequency	50Hz
Voltage	240V



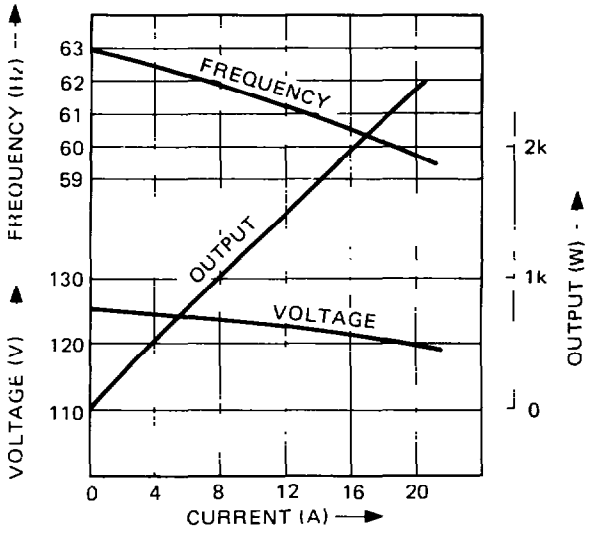
RGD2500

Output Max.	2200W
Rated	2000W
Frequency	50Hz
Voltage	110V/220V



RGD2500

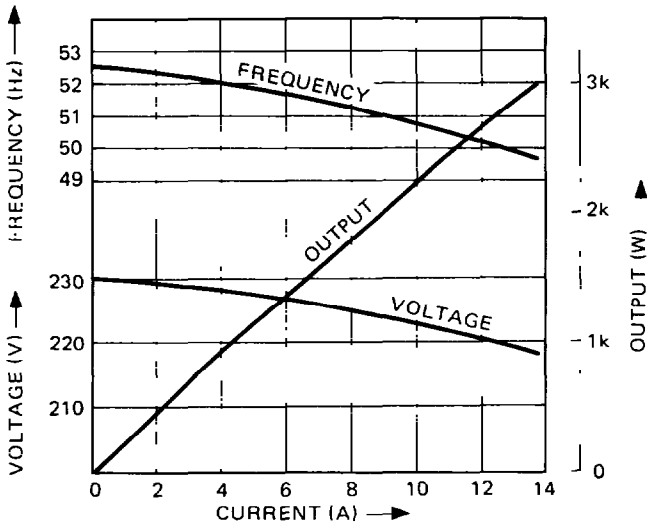
Output Max.	2500W
Rated	2300W
Frequency	60Hz
Voltage	110V/220V



RGD2500

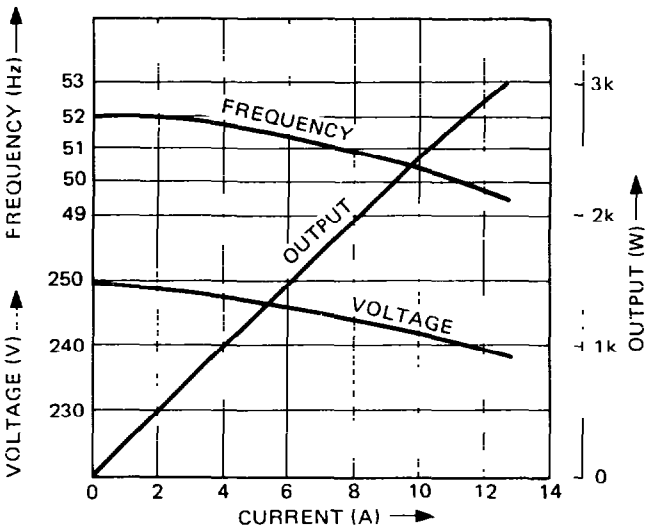
Output Max.	2500W
Rated	2300W
Frequency	60Hz
Voltage	120V

2-2 MODEL RGD3300



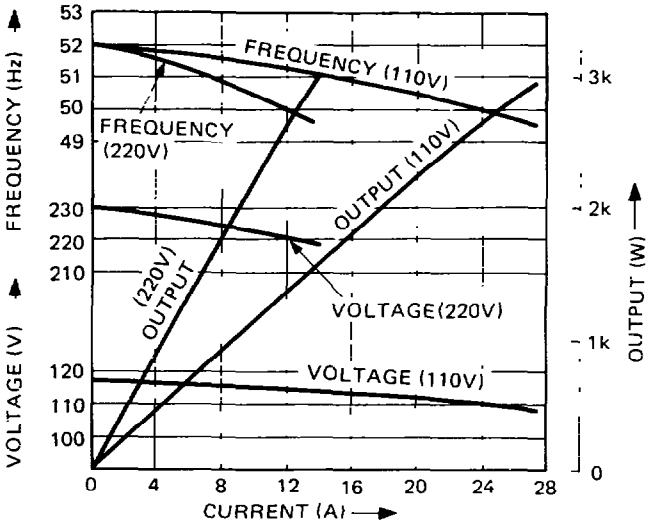
RGD3300

Output Max.	3000W
Rated	2700W
Frequency	50Hz
Voltage	220V



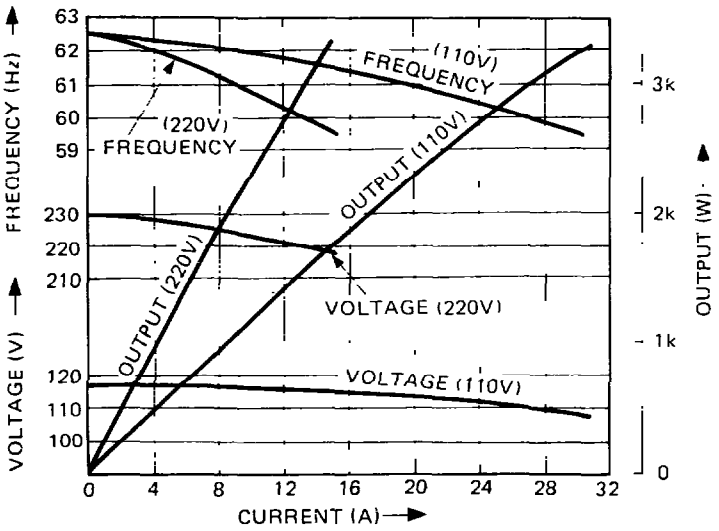
RGD3300

Output Max.	3000W
Rated	2700W
Frequency	50Hz
Voltage	240V



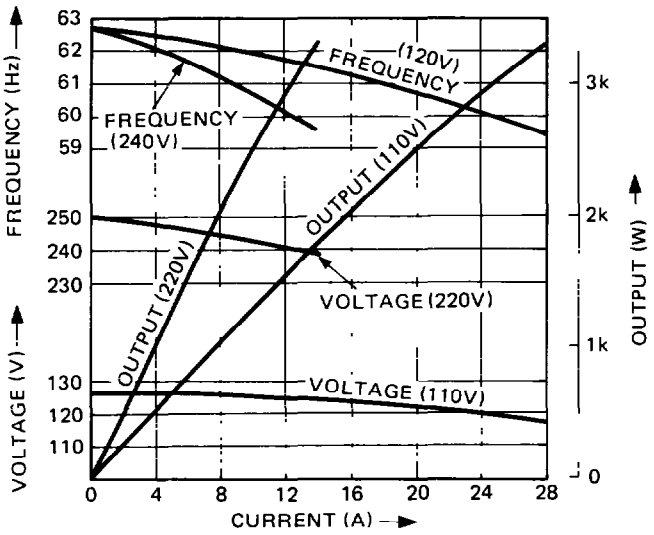
RGD3300

Output Max.	3000W
Rated	2700W
Frequency	50Hz
Voltage	110V/220V



RGD3300

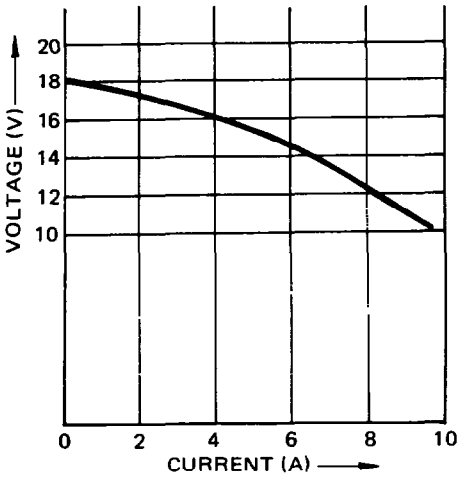
Output Max.	3300W
Rated	3000W
Frequency	60Hz
Voltage	110V/220V



RGD3300

Output Max.	3300
Rated	3000
Frequency	60Hz
Voltage	120V/240V

2-3 DC OUTPUT



DC Voltage	12V
DC Ampere	8.3A
DC Output	100W

The voltage curve shown in the left indicates the characteristic of DC output when charging a battery. The voltage may be decreased by 20% when the resistance load is applied.

NOTE: It is possible to use both DC and AC outputs simultaneously up to the rated output in total.

3. FEATURES

3-1 BRUSHLESS ALTERNATOR

Newly developed brushless alternator eliminates troublesome brush maintenance.

3-2 EASY STARTING

Light pull recoil starter accompanied with automatic decompression system makes the new RGD series generators even easier in starting than gasoline engine generators.

3-3 QUIET OPERATION

The new RGD series generator provides quiet operation by means of:

- The superb design of intake-exhaust system.
- Direct injection combustion system.
- A large super silent muffler.
- An efficient low noise air cleaner.

3-4 ECONOMICAL PERFORMANCE

On top of well known diesel economy. the air-cooled Robin diesel engine features direct fuel injection and special design refinements for extra fuel efficiency.

3-5 OIL SENSOR

The OIL SENSOR automatically shuts the engine off whenever the oil level falls down below a safe level preventing engine seizure.

3-6 COMPACT, LIGHT WEIGHT

The combination of newly developed brushless alternator and air-cooled single cylinder Robin diesel engine enables the new RGD series generators to be very compact in size and light in weight.

3-7 RELIABLE PERFORMANCE WITH MINIMAL MAINTENANCE

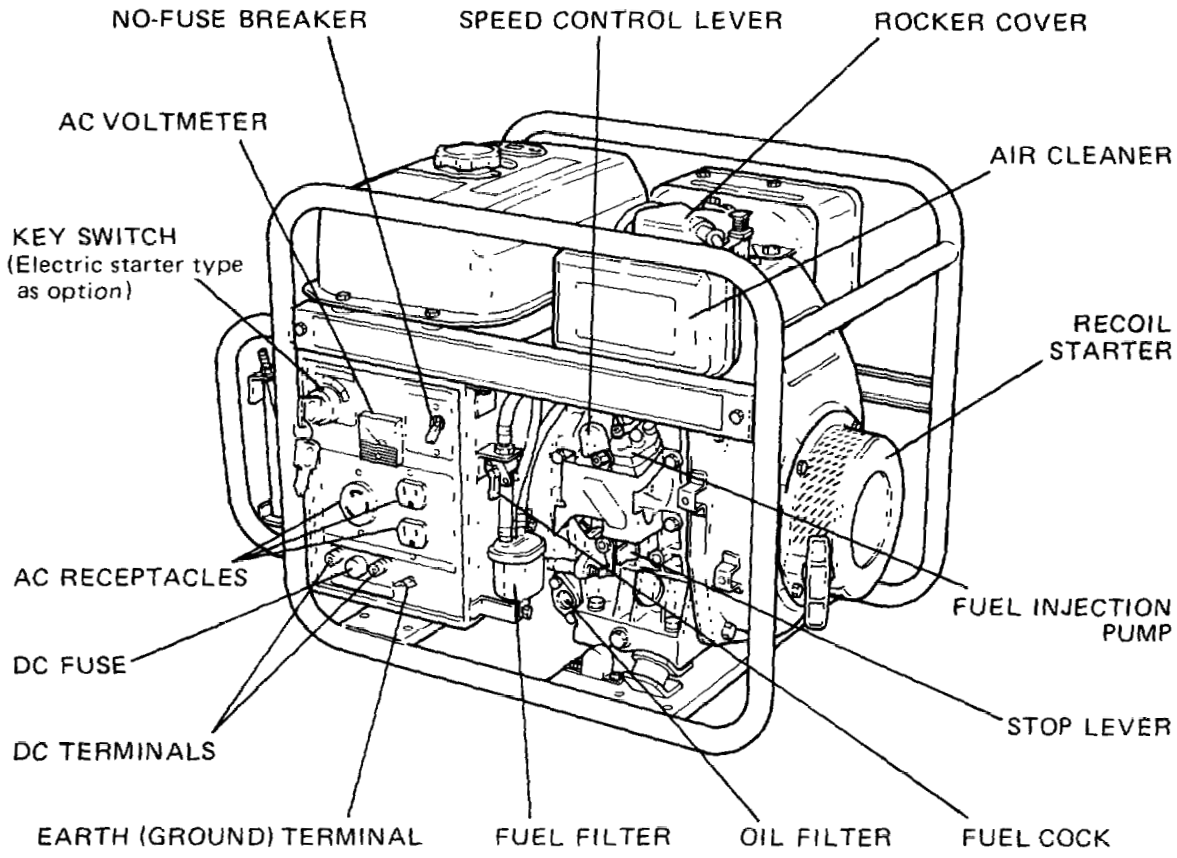
- A brushless alternator eliminates troublesome brush maintenance.
- A drip-proof alternator design.
- A trouble free condenser voltage regulator.
- A fuseless circuit breaker.
- A dust-proof dual element air cleaner.
- The OIL SENSOR automatically shuts the engine off whenever the oil level falls down below a safe level preventing engine seizure.

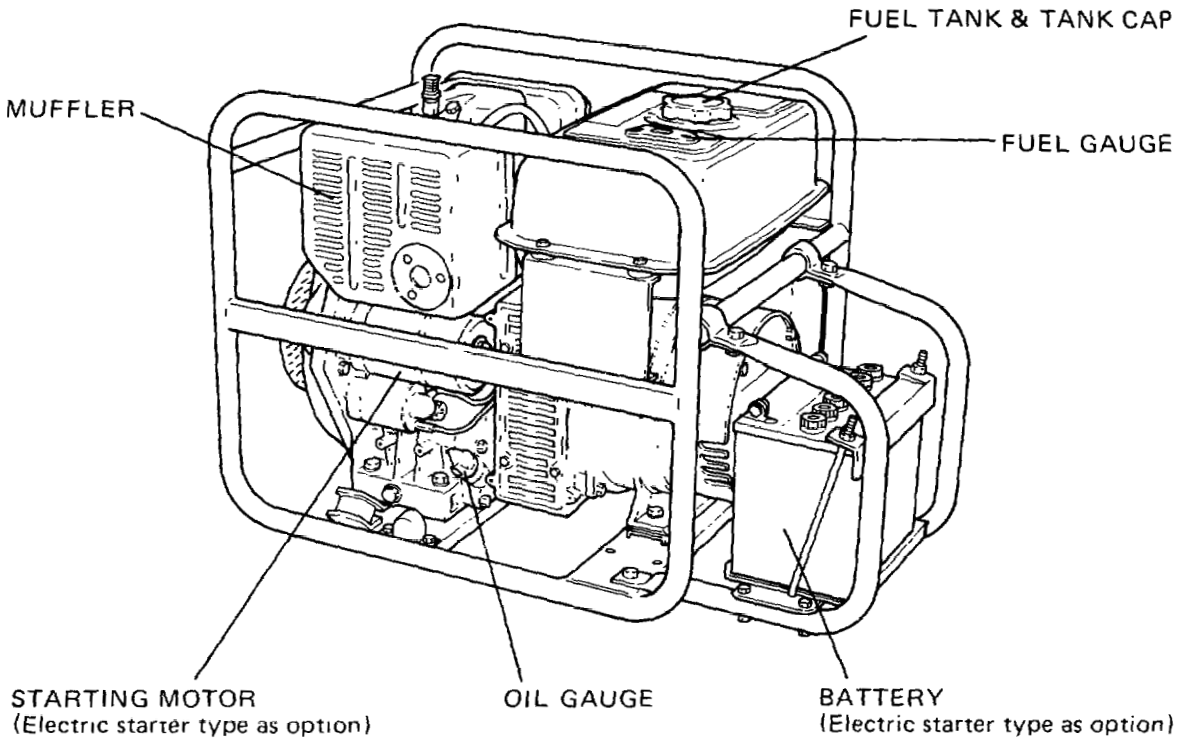
3-8 LONG-LIFE DURABILITY

- Compact and smooth running air-cooled Robin diesel engine lasts much longer than the gasoline engine of the same size.
- Trouble-free brushless alternator with condenser type voltage regulator works all the year round without any maintenace work.

4. GENERAL DESCRIPTION OF THE GENERATOR

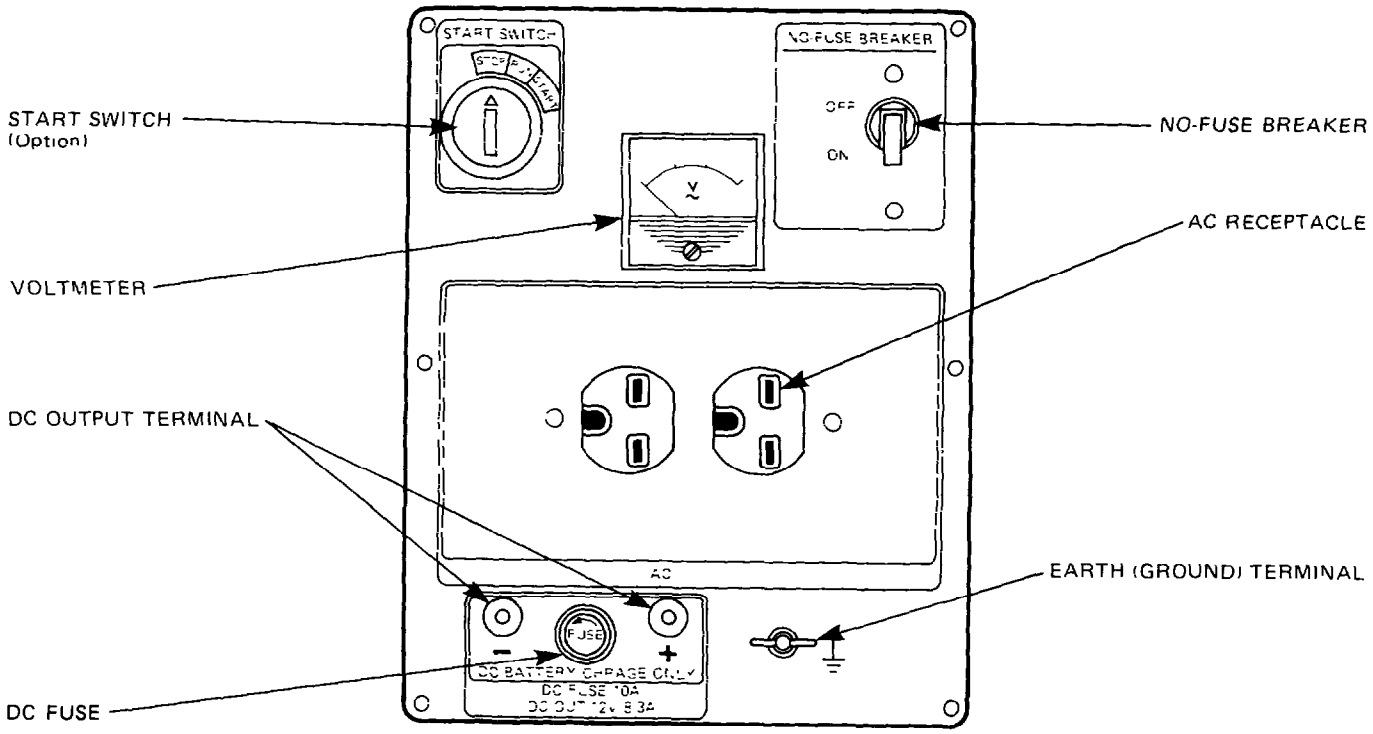
4-1 EXTERNAL VIEW of GENERATOR



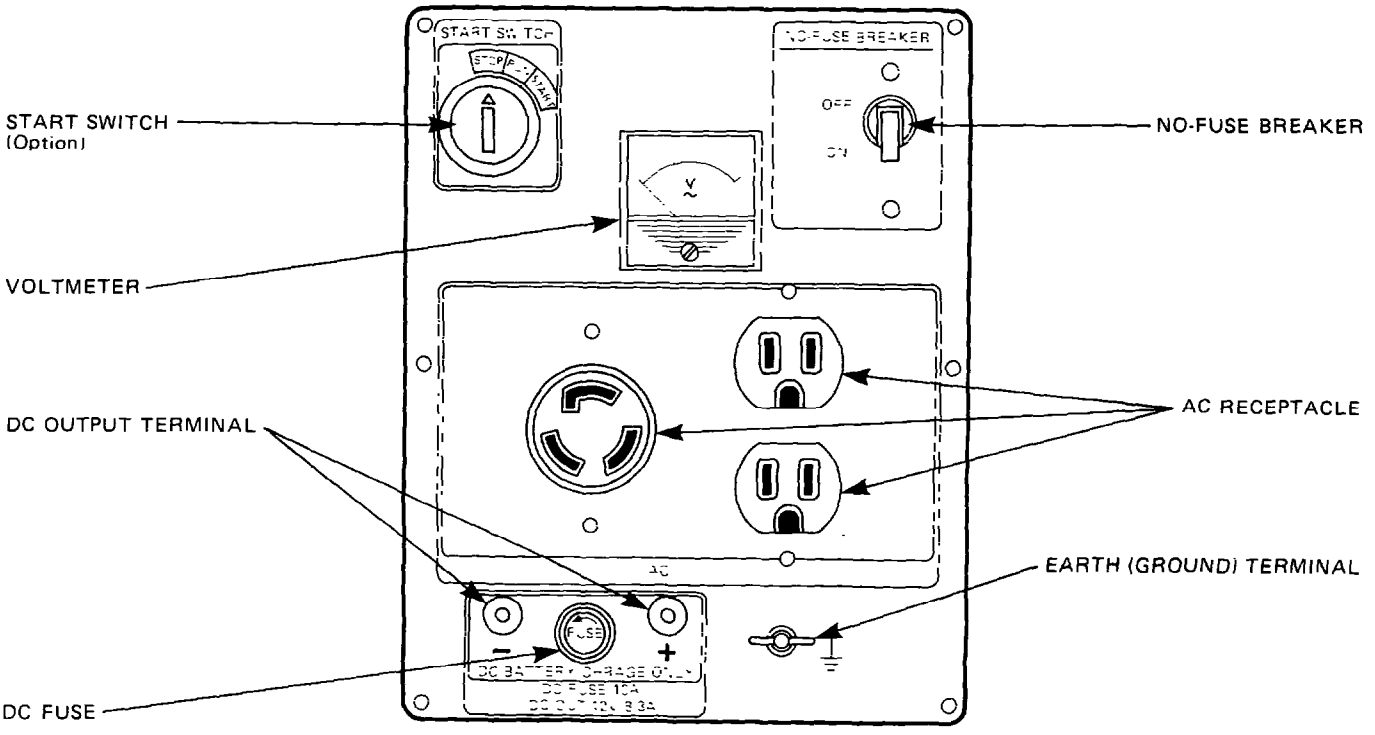


4-2 CONTROL PANEL

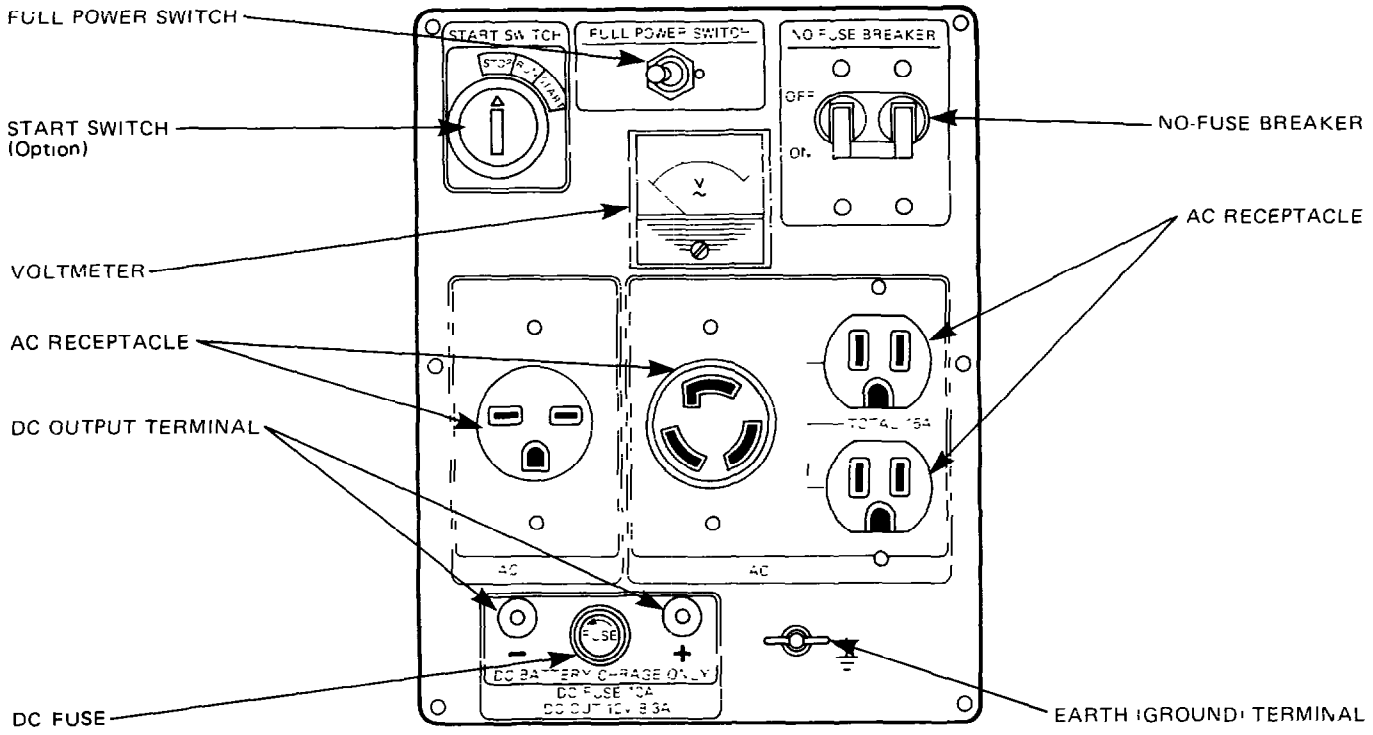
- **RGD2500, RGD3300: 50Hz-220V, 240V, 60Hz-220V TYPE**



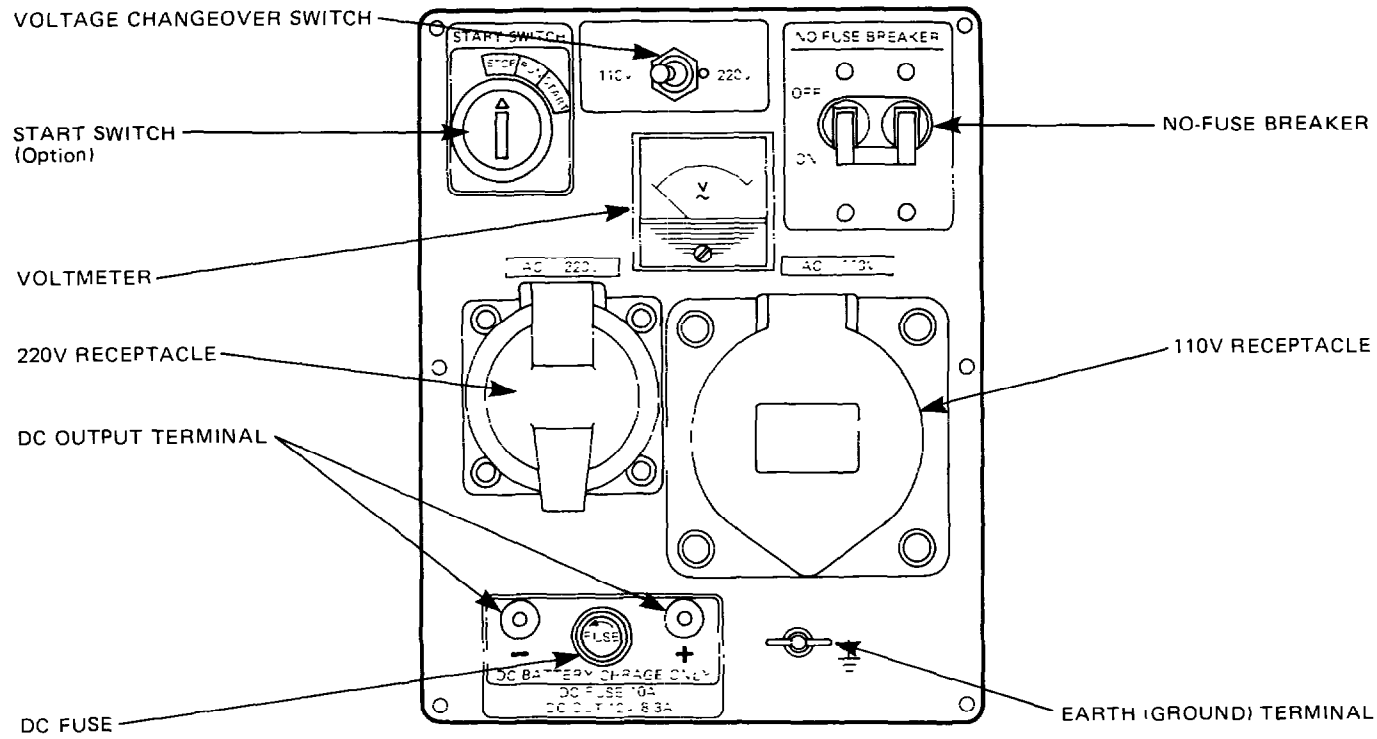
- **RGD2500, RGD3300: 50Hz-110V, 60Hz-110V, 120V TYPE**



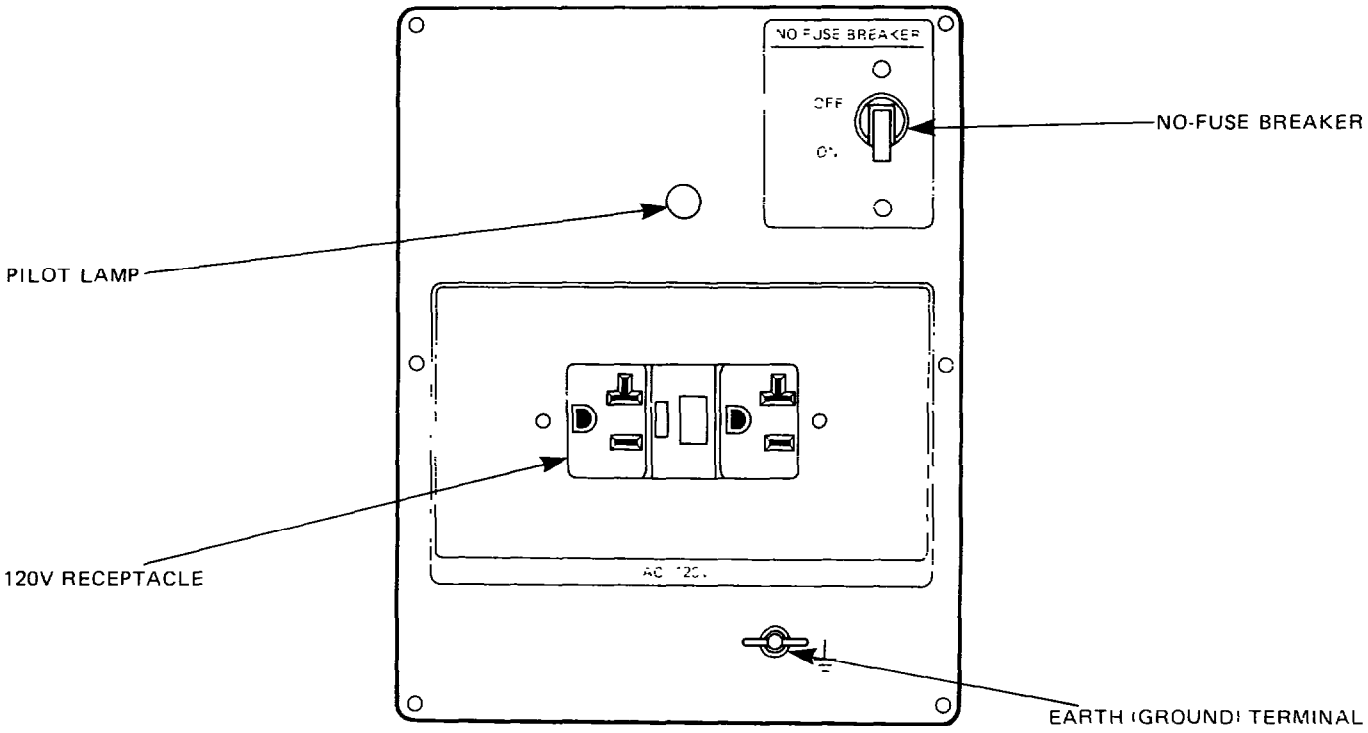
- **RGD2500, RGD3300: 50Hz-110V/220V, 60Hz-110V/220V, 120V/240V TYPE**



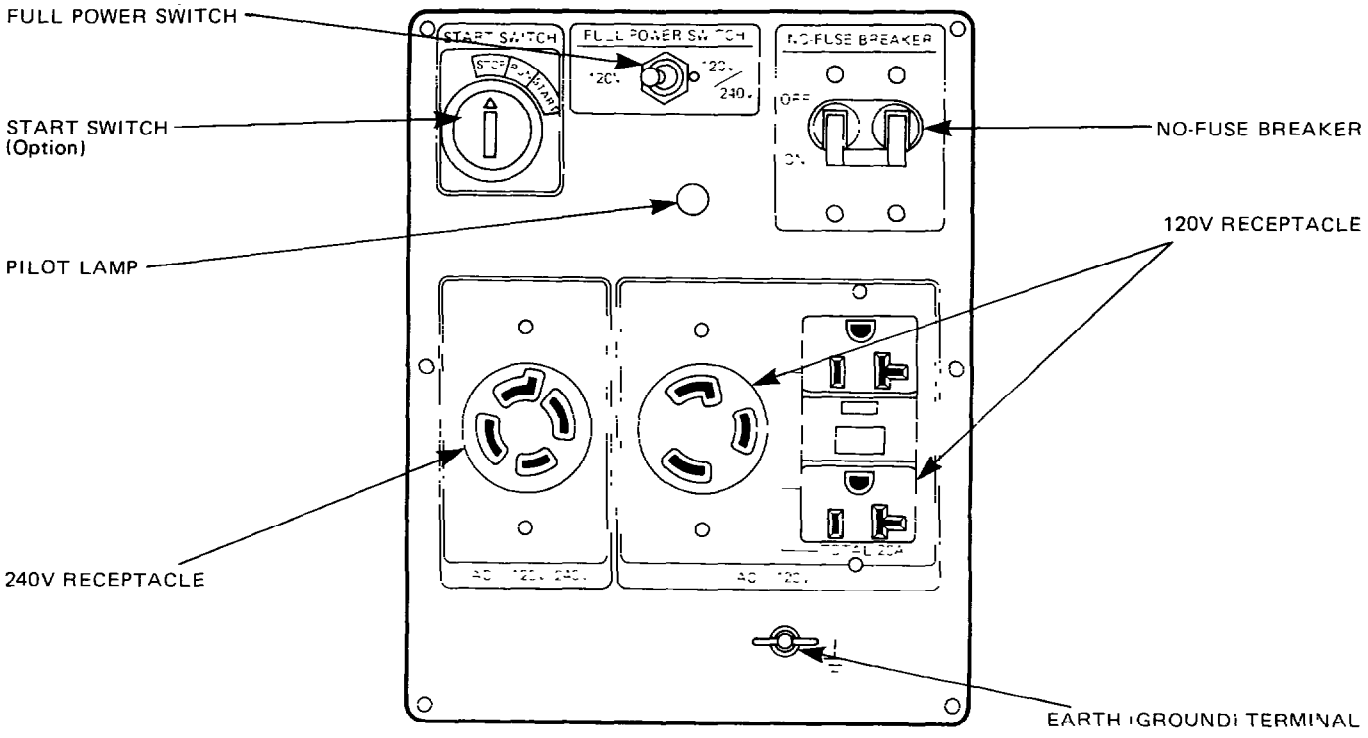
- **RGD2500, RGD3300: U.K., 50Hz-110V/220V [BS RECEPTACLE]**



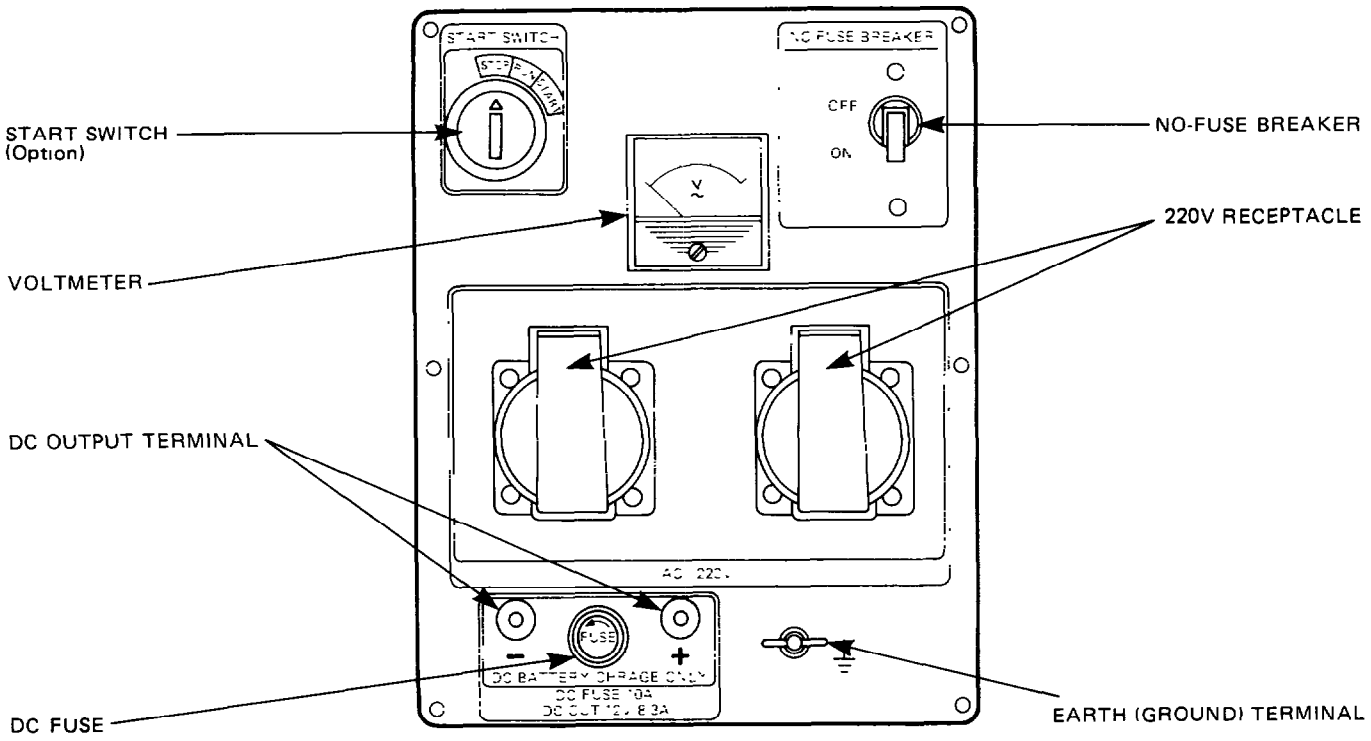
- **RGD2500: U.S.A., 60Hz-120V [NEMA RECEPTACLE]**



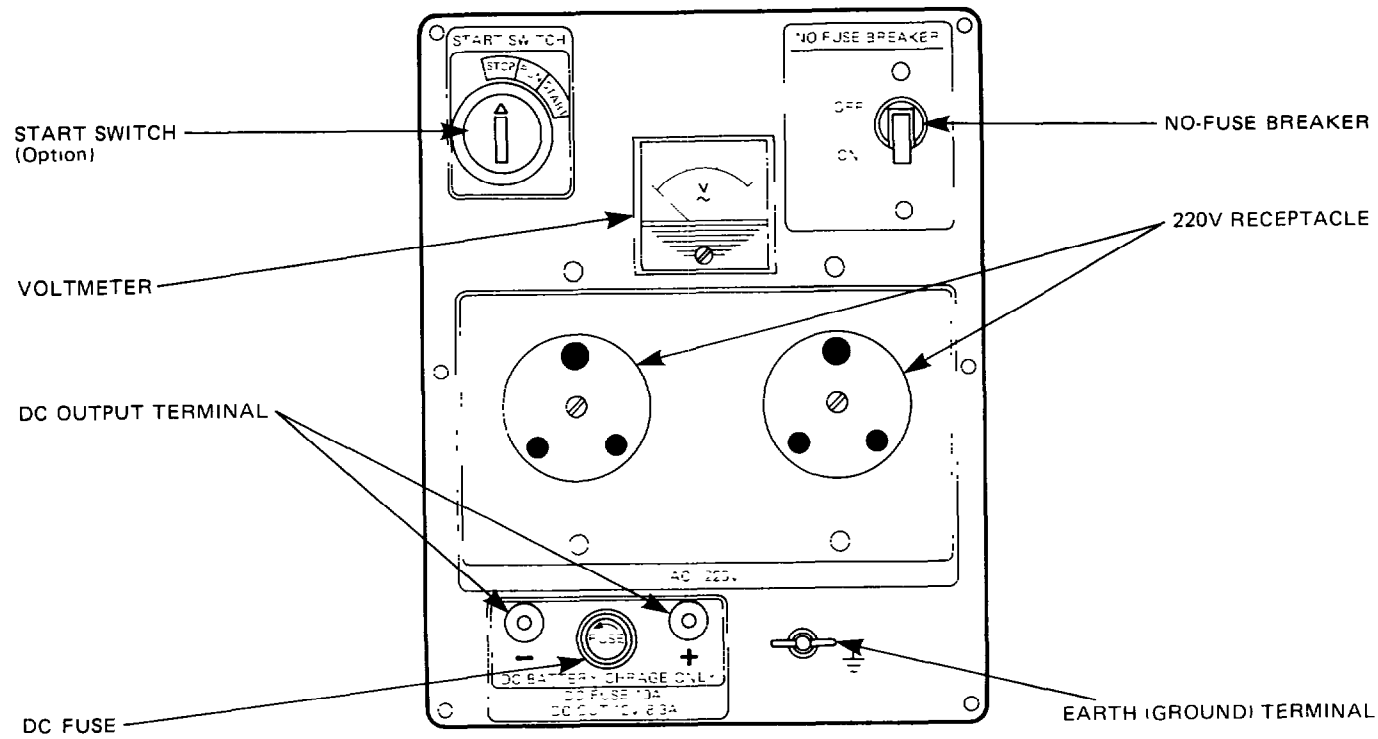
- **RGD3300: U.S.A., 60Hz-120V/240V [NEMA RECEPTACLE]**



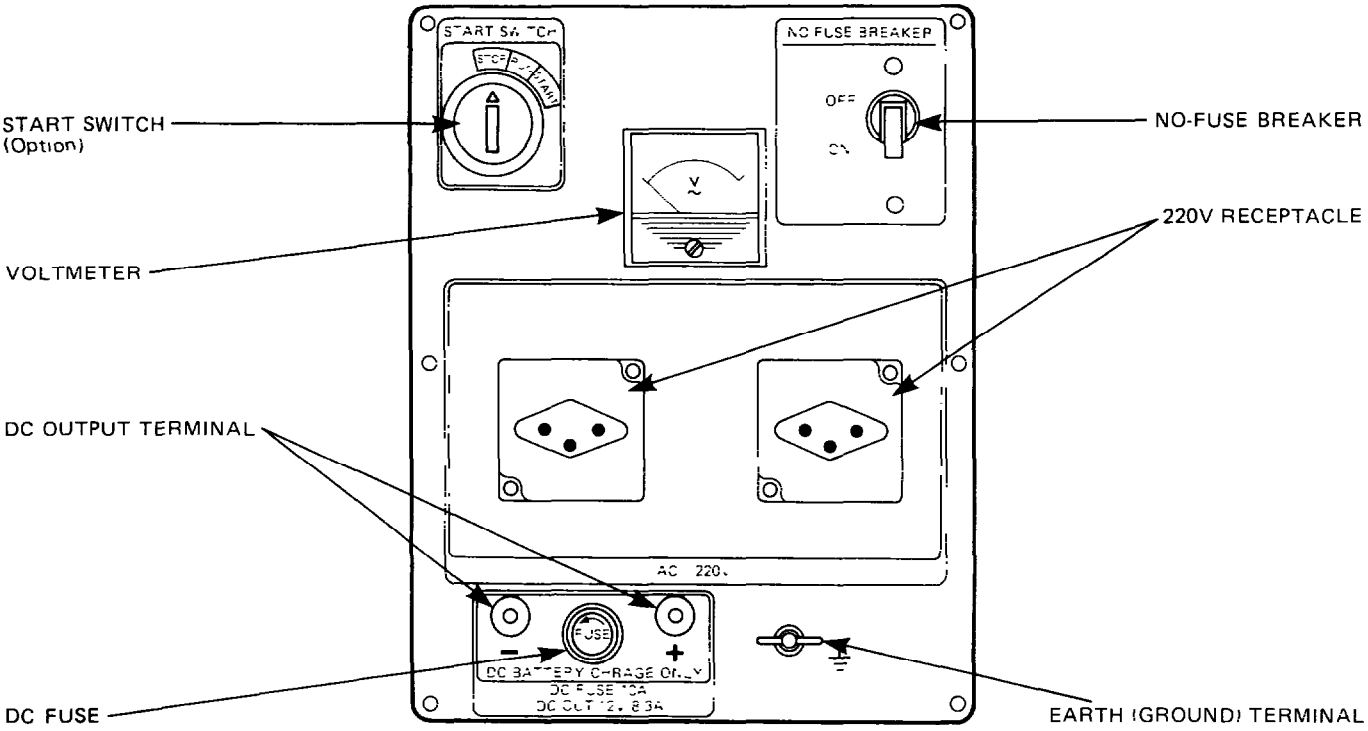
- **RGD2500, RGD3300: GERMANY, 50Hz-220V**



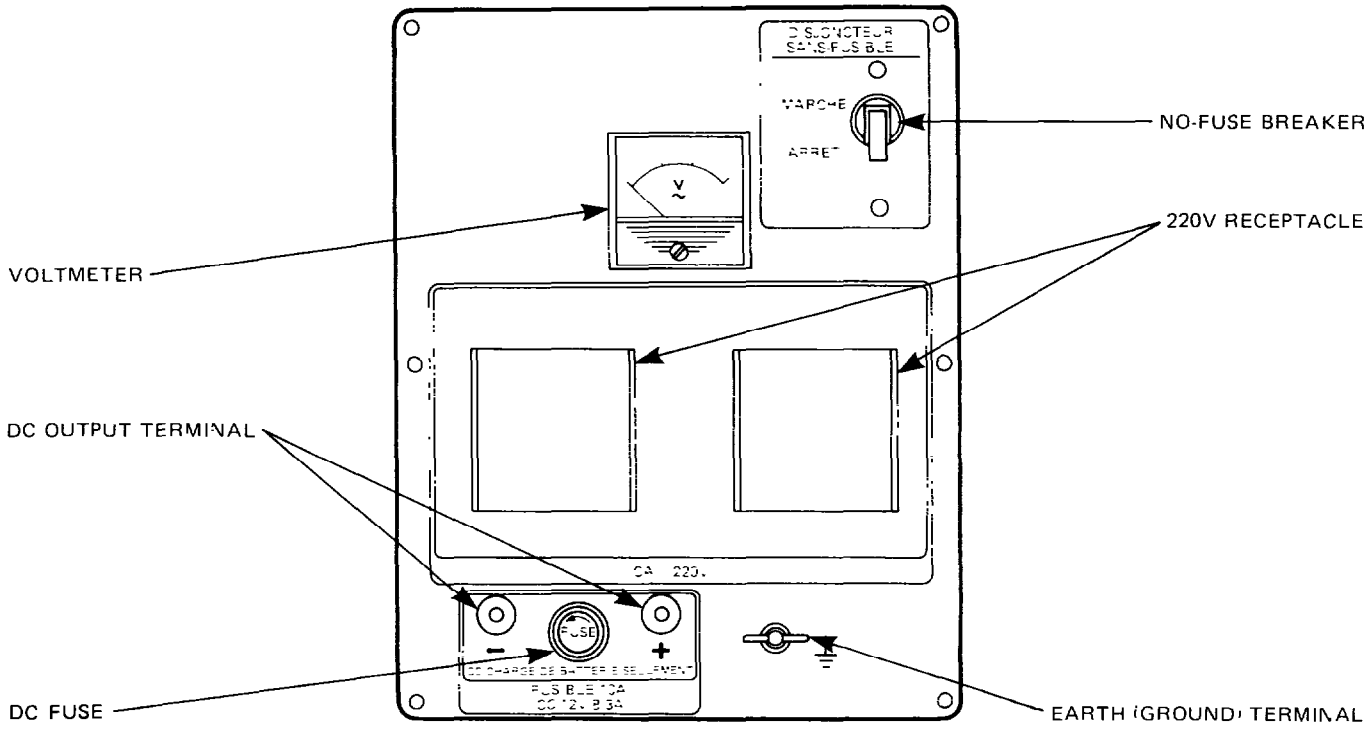
- **RGD2500, RGD3300: 50Hz-220V [WITH SPECIAL RECEPTACLE]**



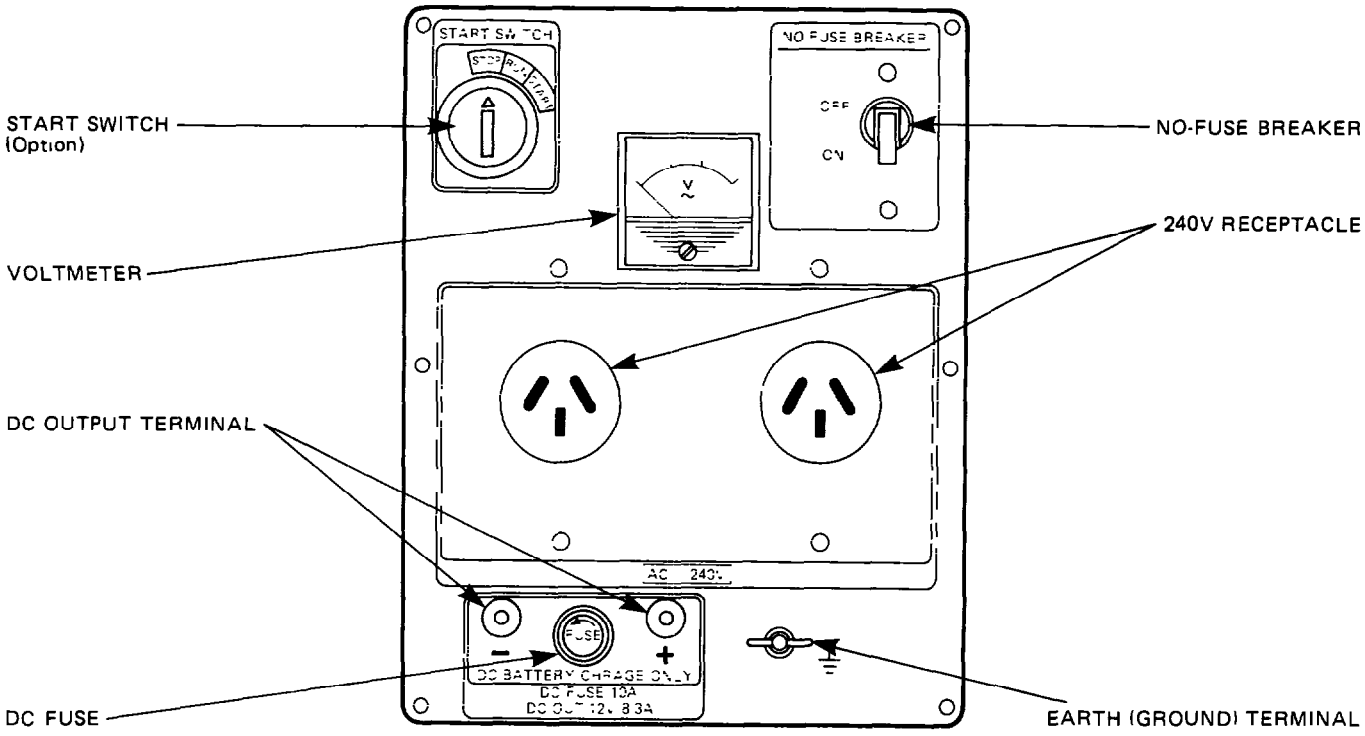
- **RGD2500, RGD3300: SWITZERLAND, 50Hz-220V**



- **RGD2500, RGD3300: FRANCE, 50Hz-220V**



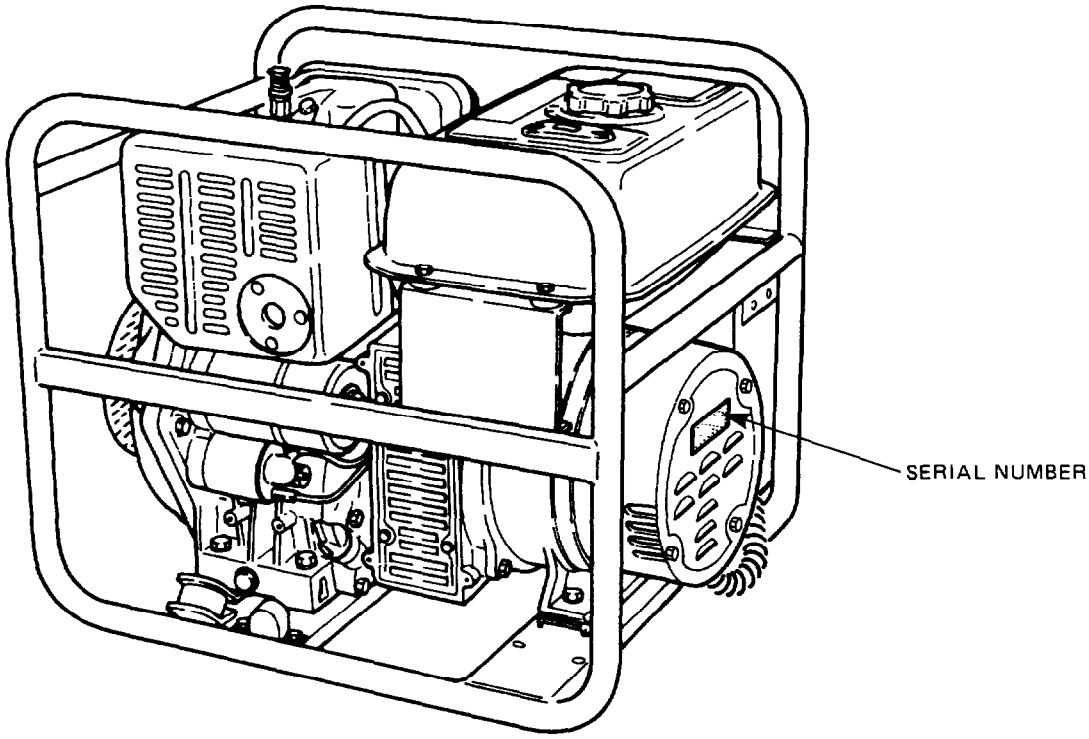
- **RGD2500, RGD3300: AUSTRALIA, 50Hz-240V**



4-3 LOCATION of SERIAL NUMBER and SPECIFICATION NUMBER

Serial number and specification number are stamped on the LABEL (MODEL NAME) stuck on the end cover.

NOTE: Always specify these numbers when inquiring about the generator or ordering spare parts in order to get correct parts and accurate service.



5. CONSTRUCTION AND FUNCTION

5-1 CONSTRUCTION

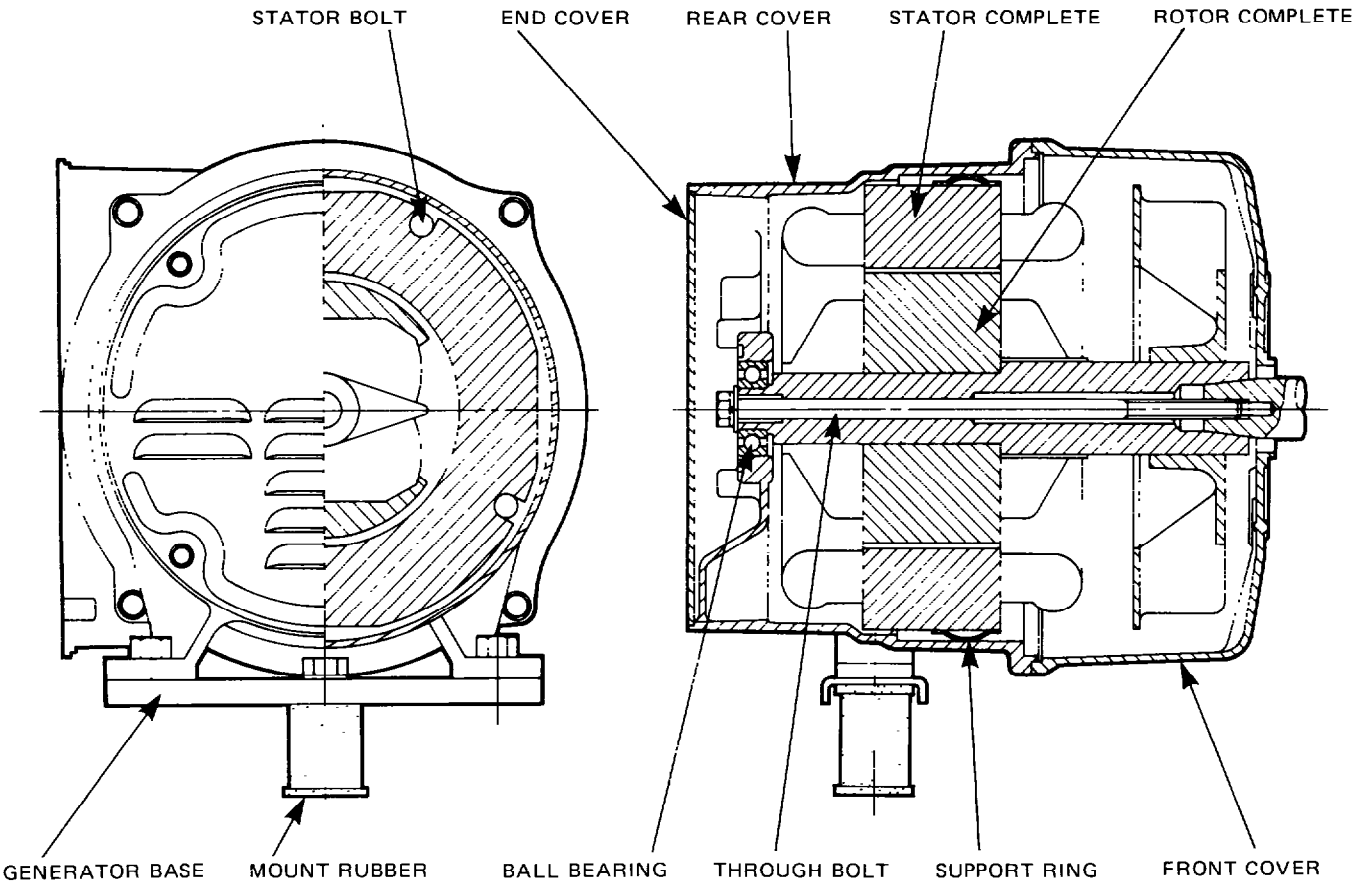


Fig. 5-1

5-2 FUNCTION

5-2-1 STATOR

The stator consists of a laminated silicon steel sheet core, a main coil and a condenser coil which are wound in the core slots.
The condenser coil excites the rotor field coil which generates AC voltage in the main coil.

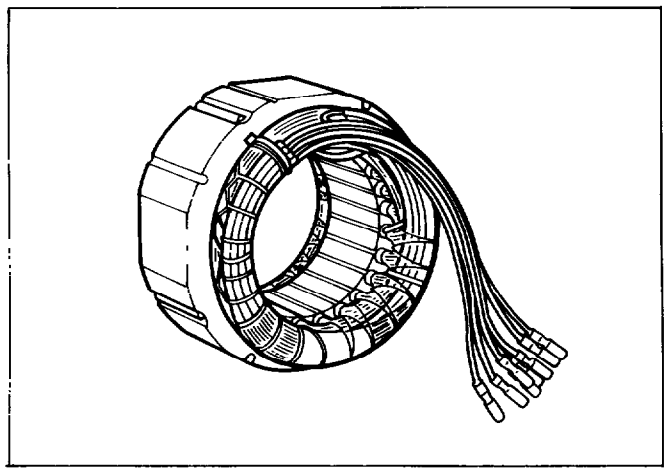


Fig. 5-2

5-2-2 CONDENSER

Two condensers are installed in the control box and are connected to the condenser coil of the stator. These condensers and condenser coil regulate the output voltage.

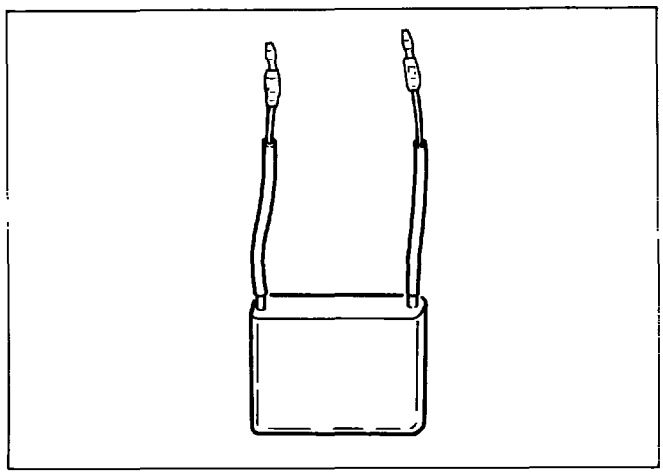


Fig. 5-3

5-2-3 ROTOR

The rotor consists of a laminated silicon steel sheet core and a field coil which is wound over the core. DC current in the field coil magnetizes the steel sheet core. Two permanent magnets are provided for the primary exciting action.

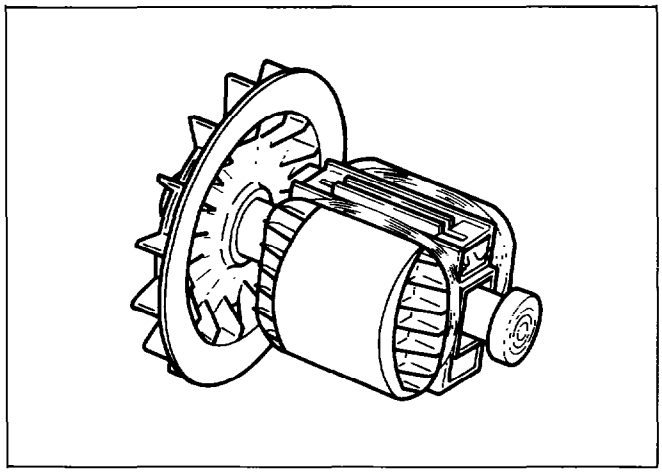


Fig. 5-4

A diode rectifier and a resistor are mounted inside of the insulator.

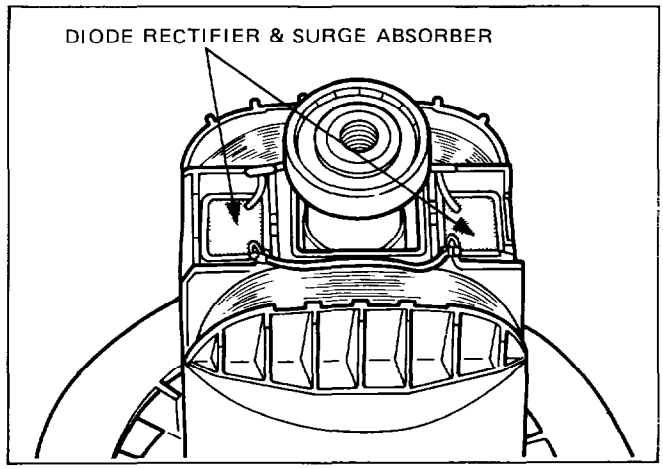


Fig. 5-5

5-2-4 FUSE

(1) The 10 ampere DC fuse mounted on the control panel protects whole DC circuit from getting damage by overload or short circuit.

(2) The 15 ampere DC fuse in the control box protects the diode rectifier from getting damage by reverse connection to the battery.
(Electric start model)

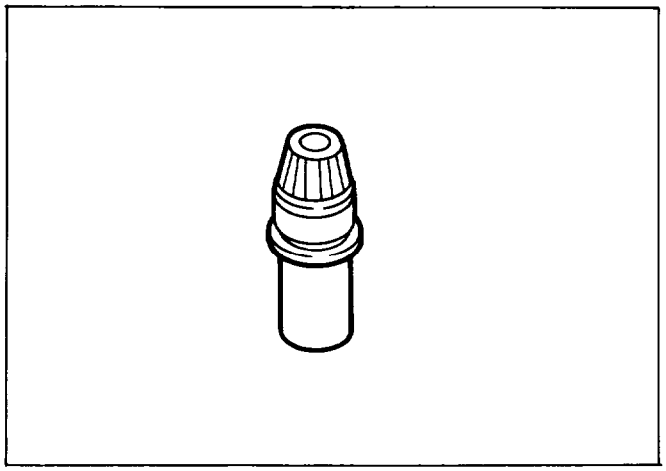


Fig. 5-6

5-2-5 NO-FUSE BREAKER

The no-fuse breaker protects the generator from getting damage by overloading or short circuit in the appliance.

GENERATOR SPECIFICATION	RATING OF NO-FUSE BREAKER	
	RGD2500	RGD3300
50Hz-110V	20A	25A
50Hz-220V	10A	12A
50Hz-240V	10A	12A
50Hz-110V/220V	10A x 2	12A x 2
60Hz-110V	20A	27A
60Hz-120V	20A	27A
60Hz-110V/220V	10A x 2	14A x 2
60Hz-120V/240V	10A x 2	14A x 2

Table 5-1

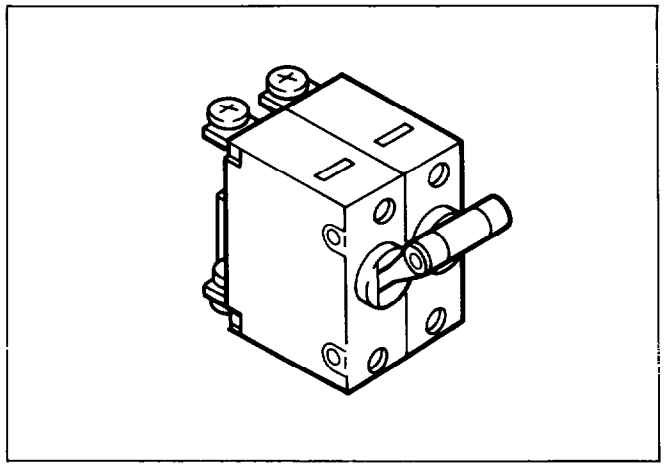


Fig. 5-7

5-2-6 RECEPTACLE and AC PLUG (STD. SPEC.)

These are used for taking AC output power from the generator. A total of four kinds of receptacles, each varying in rated voltage and current from another, are used. Each model has at least one receptacle to deliver the rated generator output. As many AC plugs as the receptacles, each matching the corresponding receptacle, are provided. Table 5-2 shows the rated current for each receptacle. Be careful not to use the receptacles and AC plugs beyond the specified limits to prevent burning.

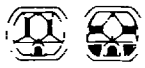
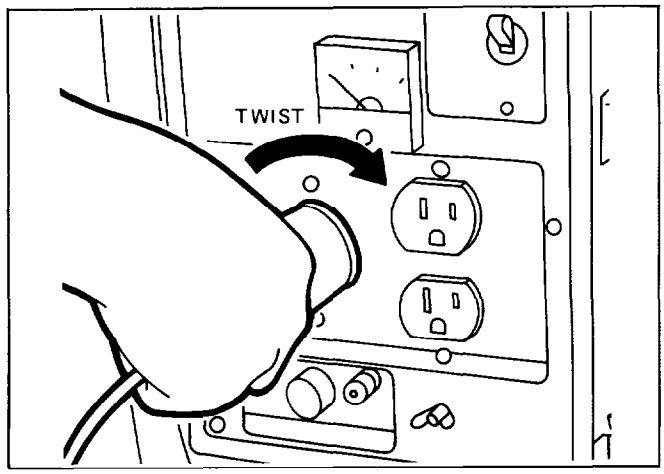
	up to total 15 amperes from two receptacles
	up to 15 amperes
	up to 30 amperes (See Caution.)

Table 5-2



Caution: To connect the appliance to locking receptacle, insert the plug into the receptacle and turn it clockwise to lock.

Fig. 5-8

NOTE: If your generator has receptacles peculiar to your country, Table 5-2 does not apply.

NOTE: The generator for U.S.A. market is equipped with NEMA standard receptacles shown in table 5-3. Use the proper plug for connecting appliance to the generator.

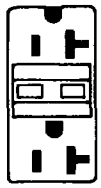
Style	Ampere	Receptacle	AC plug	Description
	125V 20A	NEMA 5-20R	NEMA 5-20P	GFCI (Ground Fault Circuit Interrupter) Receptacle, duplex
	125V 250V 20A	NEMA L14-20R	NEMA L14-20P	Locking Receptacle
	125V 30A	NEMA L5-30	NEMA L5-30P	Locking Receptacle

Table 5-3

5-3 DESCRIPTION of GENERATOR OPERATION

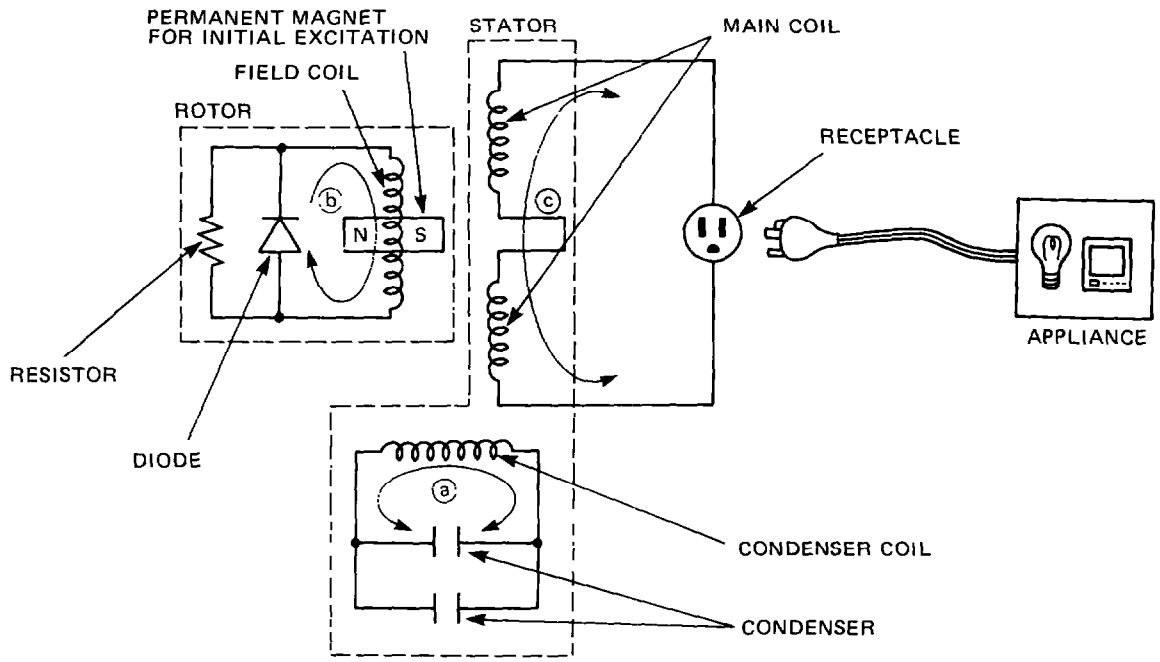


Fig. 5-9

5-3-1 GENERATION of NO-LOAD VOLTAGE

(1) When the generator starts running, the permanent magnet built-in to the rotor generates 3 to 6V of AC voltage in the main coil and condenser coil wound on the stator.

(2) As two condensers are connected to the condenser coil, the small voltage at the condenser coil generates a minute current ⓐ which flows through the condenser coil. At this time, a small flux is produced with which the magnetic force at the rotor's magnetic pole is intensified. When this magnetic force is intensified, the respective voltages in the main coil and condenser coil rise up. As the current ⓐ increases, the magnetic flux at the rotor's magnetic pole increases further. Thus the voltages at the main coil and condenser coil keep rising by repeating this process.

(3) As AC current flows through the condenser coil, the density of magnetic flux in the rotor changes. This change of magnetic flux induces AC voltage in the field coil, and the diode rectifier in the field coil circuit rectifies this AC voltage into DC. Thus a DC current flows through the field coil and magnetizes the rotor core to generate an output voltage in the main coil.

(4) When generator speed reaches 2700 to 2800 rpm (50Hz type) or 3000 to 3300 rpm (60Hz type), the current in the condenser coil and field coil increases rapidly.
This acts to stabilize the output voltage of each coils. If generator speed further increases to the rated value, the generator output voltage will reach to the rated value.

5-3-2 VOLTAGE FLUCTUATIONS UNDER LOAD

When the output current ⓒ flows through the main coil to the appliance, a magnetic flux is produced and serves to increase current ⓐ in the condenser coil. When current ⓐ increases, the density of magnetic flux across the rotor core rises. As a result, the current flowing in the field coil increases and the generator output voltage is prevented from decreasing.

5-3-3 FULL POWER SWITCH (Dual Voltage Type)

The full power switch is provided for the dual voltage type to take out the full rated power from one receptacle in each voltage.

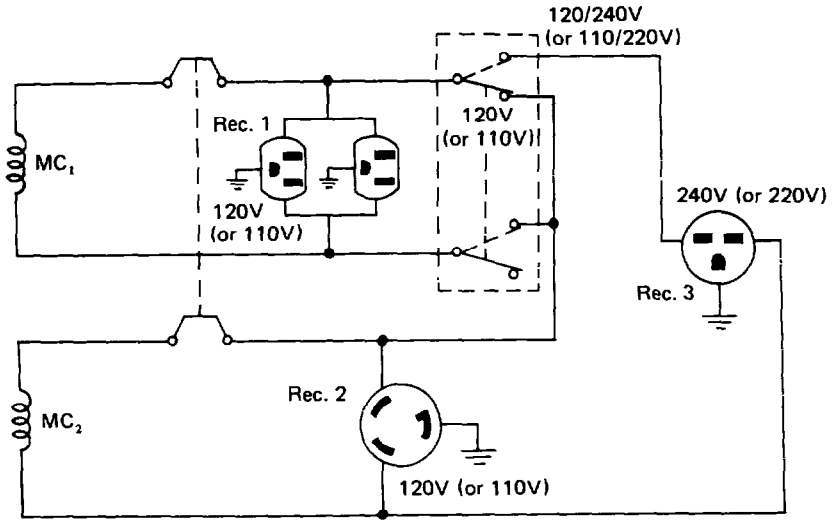


Fig. 5-10

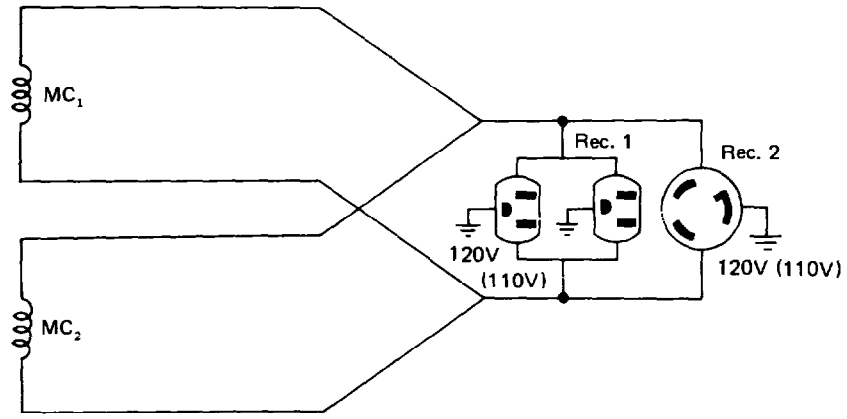


Fig. 5-11

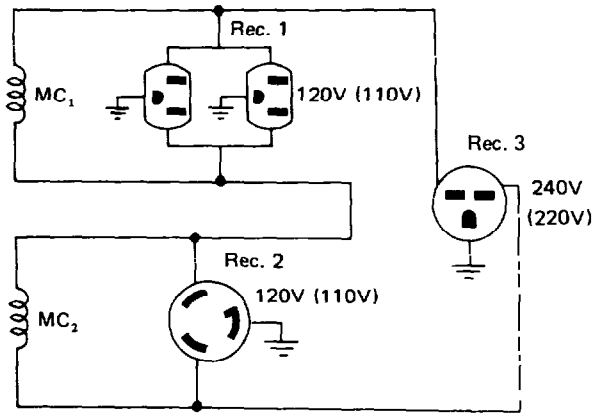


Fig. 5-12

Switch Position	LOWER VOLTAGE RECEPTACLE	HIGHER VOLTAGE RECEPTACLE
110V or 120V	Rated output	No output can be taken.
110, 220V or 120 240V	Half of rated output	Rated output

Table 5-4

Inside the generator are two sets of main coils. Each main coil outputs half the rated power at the lower voltage (110V or 120V). These main coils are wound to be in the same phase. The full power switch reconnects these main coils in parallel or in series.

Fig. 5-10 shows a circuit diagram. When the full power switch is set for single lower voltage indication (110V or 120V), the switch position is as indicated by the lower solid line in the diagram. Fig. 5-11 is a simplified representation of this circuit, showing the two main coils connected in parallel. In this case, the higher voltage (220V or 240V) at Rec. 3 cannot be taken out. Rec. 2 for the lower voltage can output up to the rated power (up to 30A if the rated current is over 30A), and Rec. 1 can output up to a total of 15A.

When the full power switch is set for double voltage indication (110V 220V or 120V 240V), the switch position is as indicated by the upper dotted line in Fig. 5-10. Fig. 5-12 is a simplified representation of this circuit, showing the two main coils connected in series. In this case, power can be taken simultaneously from the receptacles for the both voltages. Rec. 3 for the higher voltage can output up to the rated power, but Rec. 1 and Rec. 2 for the lower voltage can output only up to half the rated power each.

Table 5-4 is a summary of the above explanation. Select the proper output voltage by full power switch in accordance with the appliance to be used.

5-3-4 VOLTAGE CHANGEOVER SWITCH

The generator of 50Hz 110V 220V dual voltage type for U.K. is provided with voltage changeover switch instead of full power switch.

The output voltage is selected from 110V and 220V by turning this switch and both voltages cannot be taken out simultaneously.

The middle point of the main coil shall be grounded when the changeover switch is turned to 110V side.

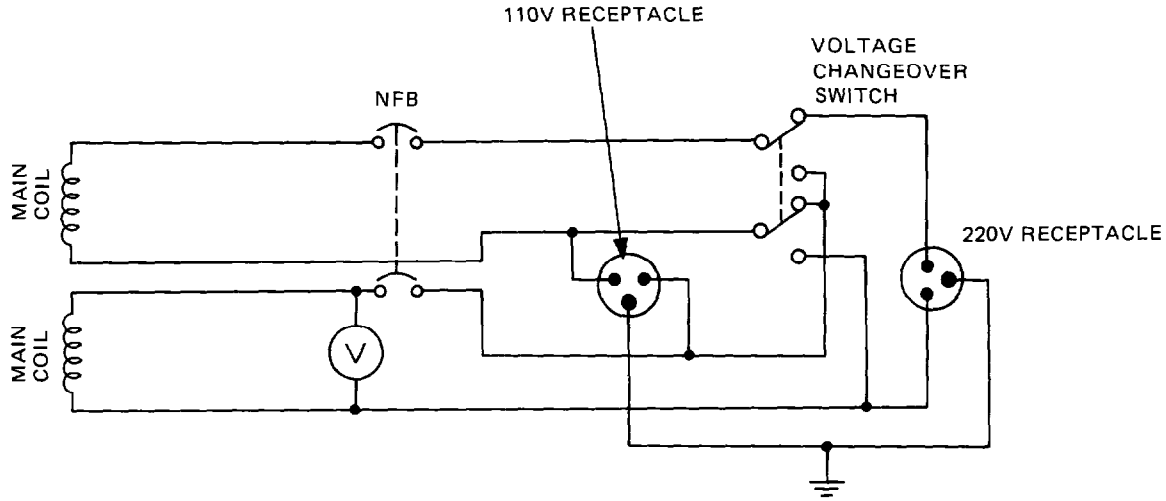


Fig. 5-13

6. SAFETY PRECAUTIONS

1. **Use extreme caution near fuel. A constant danger of explosion or fire exists.**
   Do not fill the fuel tank while the engine is running. Do not smoke or use open flame near the fuel tank. Be careful not to spill fuel when refueling. If spilt, wipe it and let dry before starting the engine.

2. **Do not place inflammable materials near the generator.**
   Be careful not to put fuel, matches, gunpowder, oily cloth, straw, and any other inflammables near the generator.

3. **Do not operate the generator in a room, cave or tunnel. Always operate in a well-ventilated area.**
   Otherwise the engine may overheat and also, the poisonous carbon monoxide contained in the exhaust gases will endanger human lives. Keep the generator at least 1 m (4 feet) away from structures or facilities during use.

4. **Operate the generator on a level surface.**
   If the generator is tilted or moved during use, there is a danger of fuel spillage and a chance that the generator may tip over.

5. **Do not operate with wet hands or in the rain.**
   Severe electric shock may occur. If the generator is wet by rain or snow, wipe it and thoroughly dry it before starting.
   Don't pour water over the generator directly nor wash it with water.
   If the generator is wet with water, the insulations will be adversely affected and may cause current leakage and electric shock.

6. **Do not connect the generator to the commercial power lines.**
   This may cause a short-circuit or damage to the generator. Use a transfer switch for connecting with indoor wiring.
   NOTE: The parts numbers of the transfer switches and of the plastic box to store them are as shown in Table 6-1.

Part No.	Part Name	Q'ty	Phase	Allowable Current
365-45604-08	Transfer Switch	1	1	15A
367-45605-08	Transfer Switch	1	1	30A
340-45606-08	Transfer Switch	1	1	60A
367-43008-08	Plastic Box	1	1	30A
348-43009-08	Plastic Box	1	1	60A

Table 6-1

7. **Use a fuse of the correct capacity. (DC output)**
   If the generator rpm is increased excessively in the overload condition by using an over rated fuse, the generator may be burnt.
   CAUTION: If the fuse is burnt out or the circuit breaker tripped off as a result of using an electrical appliance, the cause can be an overload or a short-circuit. In such a case, stop operation immediately and carefully check the electrical appliance and AC plugs for faulty wiring.

7. RANGE OF APPLICATIONS

Generally, the power rating of an electrical appliance indicates the amount of work that can be done by it. The electric power required for operating an electrical appliance is not always equal to the output wattage of the appliance. The electrical appliances generally have a label showing their rated voltage, frequency, and power consumption (input wattage). The power consumption of an electrical appliance is the power necessary for using it. When using a generator for operating an electrical appliance, the power factor and starting wattage must be taken into consideration.

In order to determine the right size generator, it is necessary to add the total wattage of all appliances to be connected to the unit.

Refer to the followings to calcurate the power consumption of each appliance or equipment by its type.

(1) Incandescent lamp, heater, etc. with a power factor of 1.0

Total power consumption must be equal to or less than the rated output of the generator.

Example: A rated 3000W generator can turn thirty 100W incandescent lamps on.

(2) Fluorescent lamps, mercury lamps, etc. with a smaller power factor

Select a generator with a rated output equivalent to 1.2 to 2 times of the power consumption of the load.

Example: A 400W mercury lamp requires 600W to 800W power source to be turned on.
A rated 3000W generator can power four or five 400W mercury lamps.

NOTE 1: If a power factor correction capacitor is not applied to the mercury lamp or fluorescent lamp, the more power shall be required to drive those lamps.
A rated 3000W generator can drive one or two 400W mercury lamps without power factor correction capacitors.

NOTE 2: Nominal wattage of the fluorescent lamp generally indicates the output wattage of the lamp. Therefore, if the fluorescent lamp has no special indication as to the power consumption, efficiency should be taken into account as explained in Item (5) on the following page.

(3) Motor driven tools and light electrical appliances

Generally the starting wattage of motor driven tools and light electrical appliances are 1.2 to 3 times larger than their running wattage.

Example: A rated 250W electric drill requires a 400W generator to start it.

(4) Initially loaded motor driven appliances such as water pumps, compressors, etc.

These appliances require the large starting wattage which is 3 to 5 times of running wattage.

Example: A rated 900W compressor requires a 4500W generator to drive it.

NOTE 1: Motor-driven appliances require the aforementioned generator output only at the starting. Once their motors are started, the appliances consume about 1.2 to 2 times their rated power consumption so that the excess power generated by the generator can be used for other electrical appliances.

NOTE 2: Motor-driven appliances mentioned in Items (3) and (4) vary in their required motor starting power depending on the kind of motor and start-up load. If it is difficult to determine the optimum generator capacity, select a generator with a larger capacity.

(5) Appliances without any indication as to power consumption

Some appliances have no indication as to power consumption; but instead the work load (output) is indicated. In such a case, power consumption is to be worked out according to the numerical formula mentioned below.

$$\frac{\text{(Output of electrical appliance)}}{\text{(Efficiency)}} = \text{(Power consumption)}$$

Efficiencies of some electrical appliances are as follows:

Single-phase motor ..... 0.6 ~ 0.75 ┐
Three-phase motor ..... 0.65 ~ 0.9 ┘ The smaller the motor, the lower the efficiency.
Fluorescent lamp ..... 0.7 ~ 0.8

Example 1: A 40W fluorescent lamp means that its luminous output is 40W. Its efficiency is 0.7 and accordingly, power consumption will be 40 ÷ 0.7 = 57W. As explained in **Item (2)**, multiply this power consumption value of 57W by 1.2 ~ 2 and you will get the figure of the necessary capacity of a generator. In other words, a generator with a rated output of 1000W capacity can light nine to fourteen 40W fluorescent lamps.

Example 2: Generally speaking, a 400W motor means that its work load is 400W. Efficiency of this motor is 0.7 and power consumption will be 400 ÷ 0.7 = 570W. When this motor is used for a motor-driven tool, the capacity of the generator should be multipled by 1.2 to 3 and 570W as explained in the **Item (3)**.

MODEL	RGD2500		RGD3300	
Frequency	50 Hz	60 Hz	50 Hz	60 Hz
Incandesent lamp, heater, etc.	2000W	2200W	2700W	3000W
Fluorescent lamp, mercury lamp, etc.	approx. 1400W	approx. 1500W	approx. 1800W	approx. 2100W
Motor-driven tool, general-purpose motor, etc.	approx. 1200W	approx. 1300W	approx. 1600W	approx. 1800W
Water pump, compressor, etc.	approx. 600W	approx. 650W	approx. 800W	approx. 900W

Table 7-1

NOTES: Wiring between generator and electrical appliances

1. *Allowable current of cable*
   Use a cable with an allowable current that is larger than the rated input current of the load (electrical appliance). If the input current is larger than the allowable current of the cable used, the cable will become excessively heated and deteriorate the insulation, possibly burning it out.
   Table 7-2 shows cables and their allowable currents for your reference.
2. *Voltage drop in long electric extension cords*
   When a long wire is used to connect an appliance with the generator, a certain amount of voltage drop occurs in the wire which lessens effective voltage available to the appliance.
   The table below has been prepared to illustrate the approximate voltage loss when an extension cord of 300 feet (approx. 100 meters) is used to connect an appliance or tool to the generator.

Nominal cross section	A.W.G. Gauge No.	Allowable current	No. of strands/strand dia.	Resistance	Current Amp.							
mm^2	No.	A	No. mm	Ω 100 m	1A	3A	5A	8A	10A	12A	15A	Voltage drop
0.75	18	7	30 0.18	2.477	2.5	8V	12.5V	–	–	–	–	
1.27	16	12	50 0.18	1.486	1.5V	5V	7.5V	12V	15V	18V	–	
2.0	14	17	37 0.26	0.952	1V	3V	5V	8V	10V	12V	15V	
3.5	12 ~ 10	23	45 0.32	0.517	–	1.5V	2.5V	4V	5V	6.5V	7.5V	
5.5	10 ~ 8	35	70 0.32	0.332	–	1V	2V	2.5V	3.5V	4V	5V	

Table 7-2

Voltage drop indicates as $V = \frac{1}{100} \times R \times I \times \ell$

R means resistance (Ω 100 m) on the above table.
I means electric current through the wire (A).
ℓ means the length of the wire (m).

The length of the wire indicates round length. it means twice the length from generator to electrical tools.

8. MEASURING PROCEDURES

8-1 MEASURING INSTRUMENTS

8-1-1 VOLTMETER

AC voltmeter is necessary. The approximate AC voltage ranges of the voltmeters to be used for various types of generators are as follows:

0 to 150V: Type with an output voltage of 110 or 120V

0 to 300V: Type with an output voltage of 220, 230, or 240V

0 to 150V, 0 to 300V: Dual voltage type

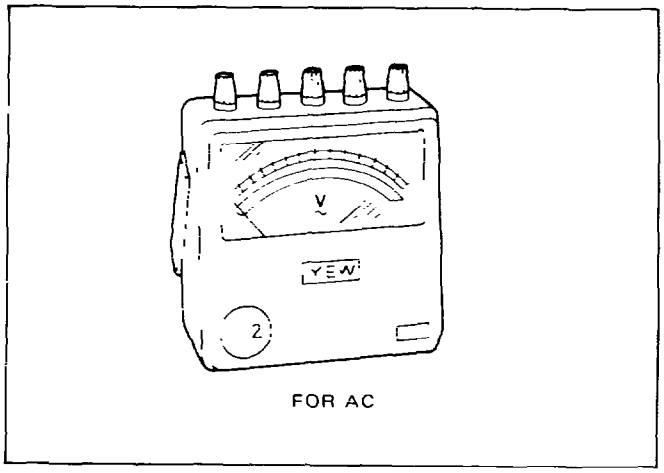


Fig. 8-1

8-1-2 AMMETER

AC ammeter is necessary. An AC ammeter with a range that can be changed according to the current rating of a given generator is most desirable. (About 10A, 20A, 100A)

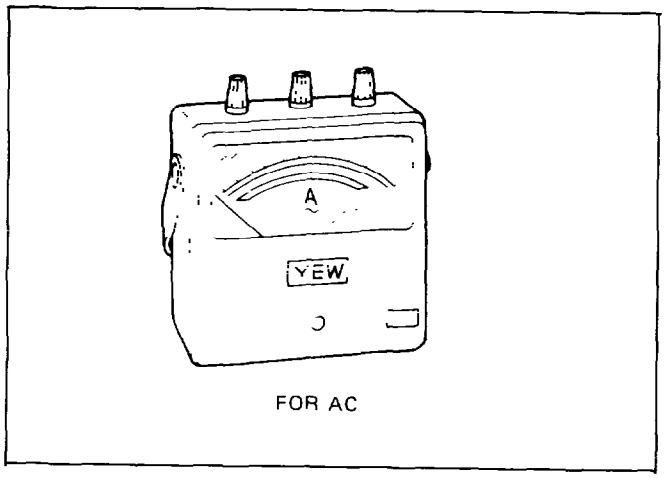


Fig. 8-2

8-1-3 FREQUENCY METER

Frequency range: About 45 to 65Hz

NOTE: Be careful of the frequency meter's input voltage range.

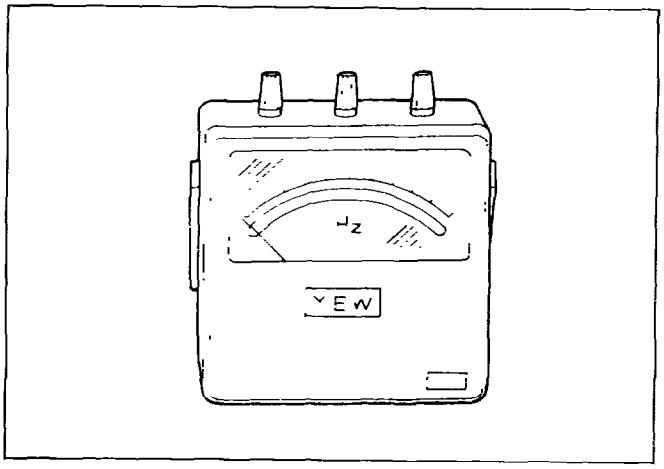


Fig. 8-3

8-1-4 TESTER

Used for measuring resistance, etc.

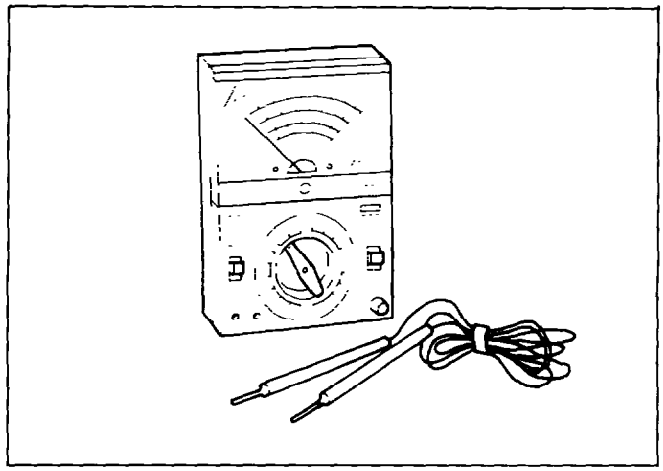


Fig. 8-4

8-1-5 MEGGER TESTER

Used for measuring generator insulation resistance. Select one with testing voltage range of 500V.

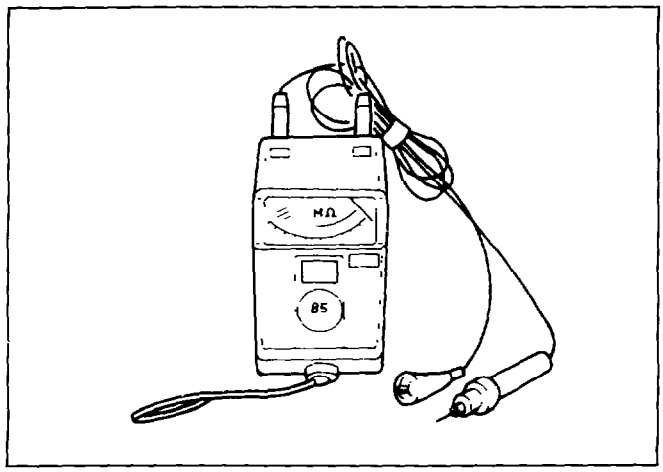


Fig. 8-5

8-1-6 TACHOMETER

There are various types of tachometers, such as contactless type, contact type, and strobe type. The contact type can be used only when the generator and engine have been disassembled. The contactless type is recommended.

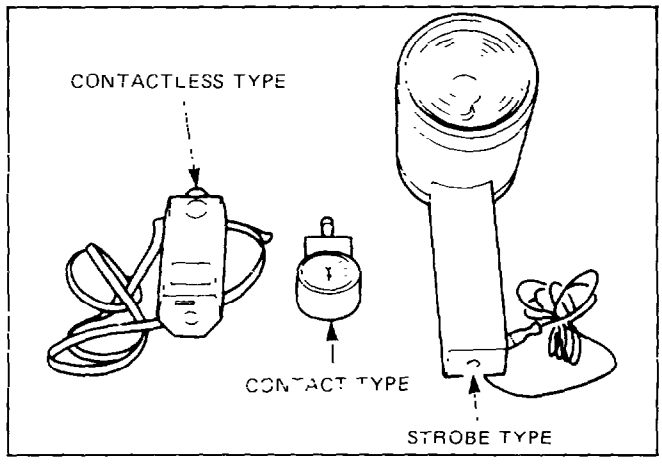


Fig. 8-6

8-2 AC OUTPUT MEASURING

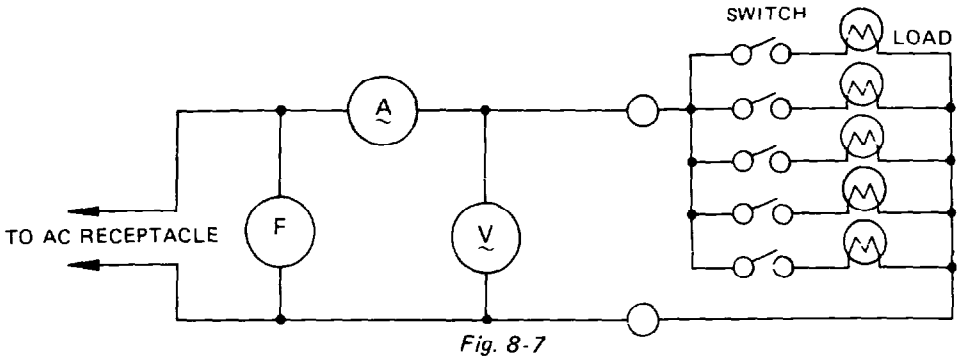


Fig. 8-7

Use a circuit like the one shown in Fig. 8-7 for measuring AC output. A hot plate or lamp with a power factor of 1.0 may be used as a load. Adjust the load and rpm. and check that the voltage range is as specified in Table 8-1 at the rated amperage and rated rpm.

Rated voltage	110V	120V	220V	240V
Voltage range	107 ~ 119V	117 ~ 130V	215 ~ 238	235 ~ 260

Table 8-1

8-3 MEASURING INSULATION RESISTANCE

Connect a megger tester to one of receptacle output terminals and the ground terminal. then measure the insulation resistance. An insulation resistance of 1 megohm or more is normal. (The original insulation resistance at the time of shipment from the factory is 10 megohms or more.)

If it is less than 1 megohm. disassemble the generator and measure the insulation resistance of the stator, rotor and control panel individually.

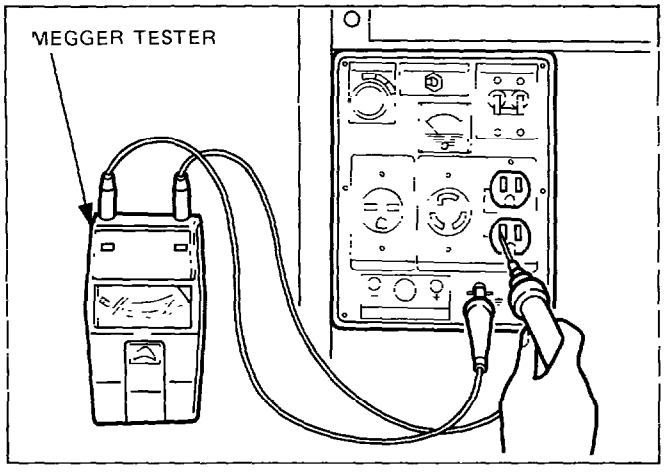


Fig. 8-8

• STATOR

(1) Measure the insulation resistance between BLUE lead and the core.
(2) Measure the insulation resistance between WHITE lead and the core.
(3) Measure the insulation resistance between YELLOW lead and the core.
(4) Measure the insulation resistance between BLACK lead and the core.

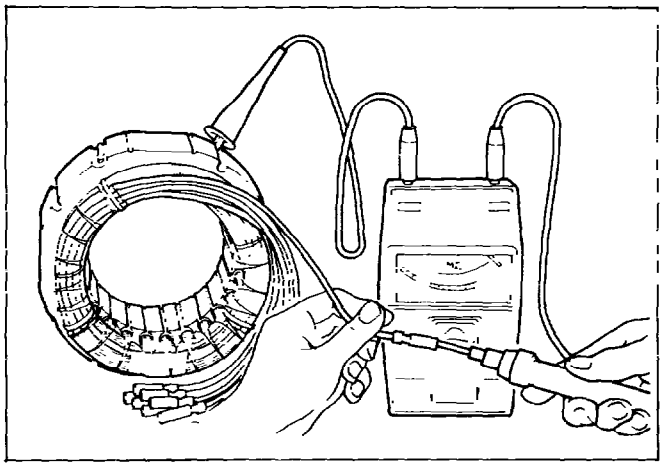


Fig. 8-9

• ROTOR

Measure the insulation across one of the soldered terminals of the rotor and the core.

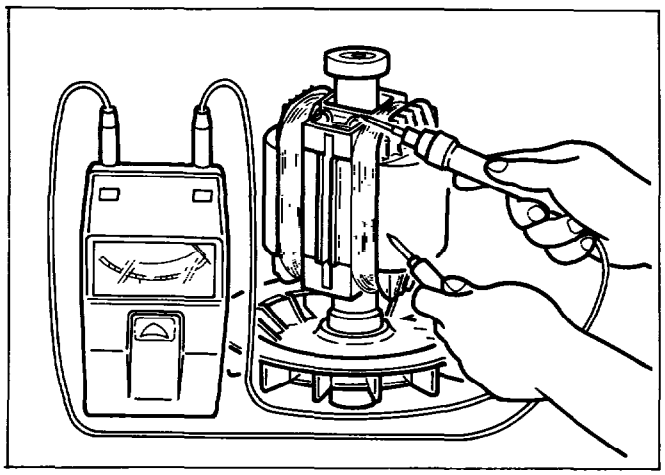


Fig. 8-10

• CONTROL PANEL

Measure the insulation resistances between the live parts and the grounded parts.

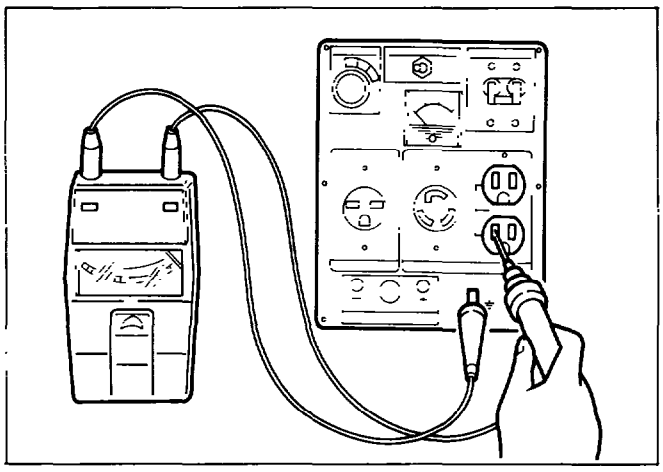


Fig. 8-11

Any part where the insulation resistance is less than 1 MΩ has faulty insulation, and may cause electric leakage and electric shock.
Replace the faulty part.

9. CHECKING FUNCTIONAL MEMBERS

9-1 VOLTMETER and PILOT LAMP

Models RGD2500 and RGD3300 have a voltmeter that comes in two types: 150V maximum type and 300V maximum type. The voltmeter indicates generator output voltages. The generators with a generated voltage of 110V or 120V and dual voltage type use the 150V maximum type voltmeter; and those of 220V, 230V and 240V specifications use the 300V maximum type voltmeter.

Generator for U.S.A. employs a pilot lamp. The lamp lights when a voltage is generated. The pilot lamp also comes in two types: 125V type and 240V type. These types are selected to suit generator output voltage.

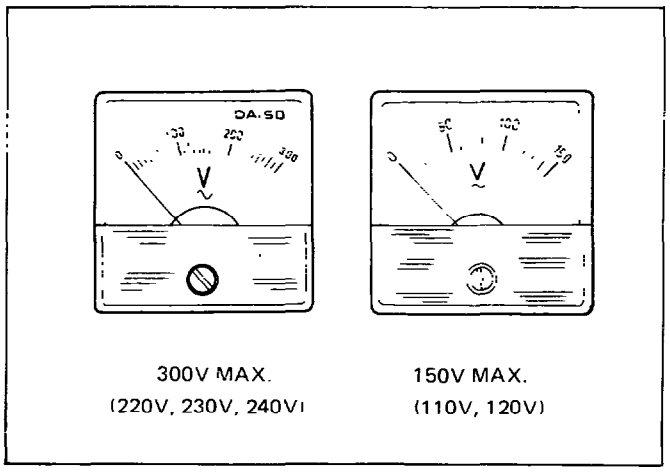


Fig. 9-1A

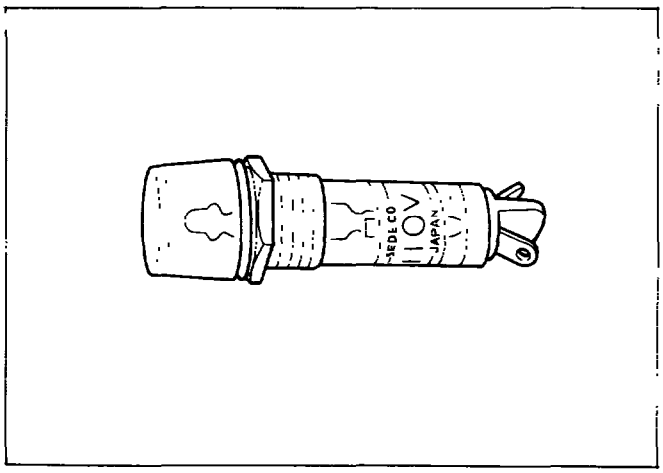


Fig. 9-1B

9-2 AC RECEPTACLES

Using a circuit tester, check continuity between the two terminals at the rear of the AC receptacles while the receptacle is mounted on the control panel. When continuity is found between the output terminals of the receptacle with a wire connected across these terminals, the AC receptacle is normal. When the wire is removed and no continuity is found between these terminals, the receptacles are also normal.

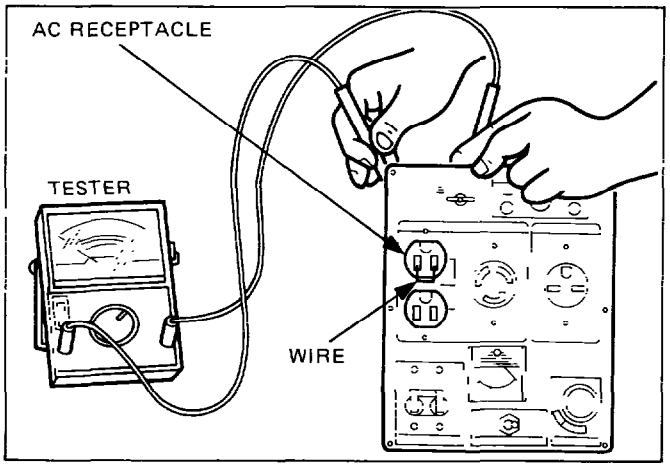


Fig. 9-2A

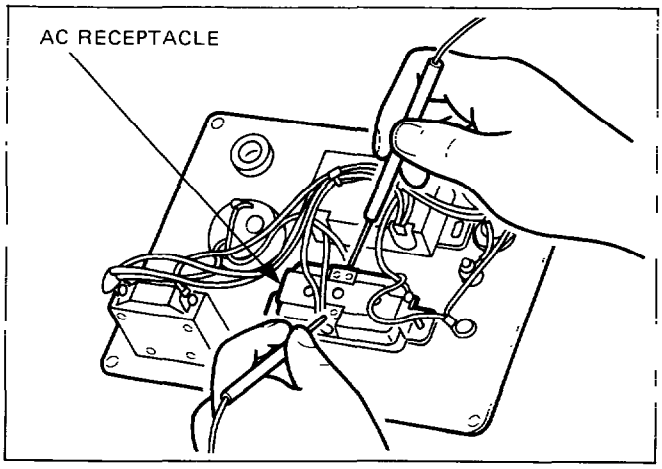


Fig. 9-2B

9-3 CIRCUIT BREAKER

Check continuity between each of two terminals at the rear of the circuit breaker while it is mounted on the control panel. Normally, there is continuity between each of the two when the circuit breaker is on while there is no continuity when the circuit breaker is off.

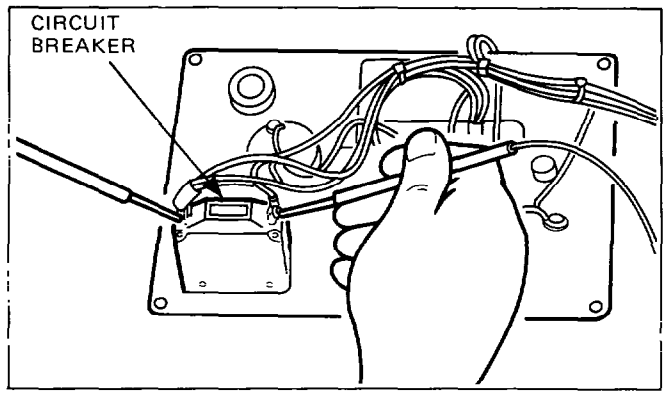


Fig. 9-3

9-4 STATOR

Disengage connectors on the wires from stator and check the resistance between wires with a circuit tester referring to the following table.

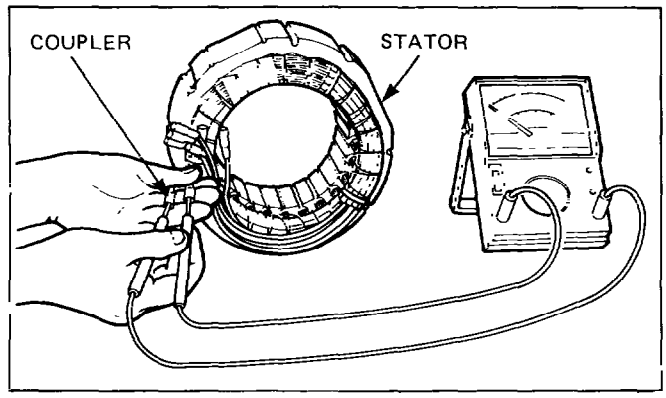


Fig. 9-4

(R x 1Ω ±10%)

Model	Specifications	Brown-White	Blue-Skyblue	Yellow-Yellow	Black-Orange
RGD2500	50Hz-110V	0.86Ω	0.86Ω	0.16Ω	2.1Ω
	50Hz-220V	0.86Ω	0.86Ω	0.16Ω	2.1Ω
	50Hz-240V	0.91Ω	0.91Ω	0.16Ω	2.1Ω
	50Hz-110V/220V	0.86Ω	0.86Ω	0.16Ω	2.1Ω
	60Hz-110V	0.66Ω	0.66Ω	0.12Ω	1.9Ω
	60Hz-120V	0.66Ω	0.66Ω	0.12Ω	1.9Ω
	60Hz-110V/220V	0.66Ω	0.66Ω	0.12Ω	1.9Ω
	60Hz-120V/240V	0.66Ω	0.66Ω	0.12Ω	1.9Ω
RGD3300	50Hz-110V	0.64Ω	0.64Ω	0.14Ω	1.9Ω
	50Hz-220V	0.64Ω	0.64Ω	0.14Ω	1.9Ω
	50Hz-240V	0.77Ω	0.77Ω	0.14Ω	1.9Ω
	50Hz-110V/220V	0.64Ω	0.64Ω	0.14Ω	1.9Ω
	60Hz-110V	0.44Ω	0.44Ω	0.11Ω	1.6Ω
	60Hz-220V	0.44Ω	0.44Ω	0.11Ω	1.6Ω
	60Hz-110V/220V	0.44Ω	0.44Ω	0.11Ω	1.6Ω
	60Hz-120V/240V	0.44Ω	0.44Ω	0.11Ω	1.6Ω

Table 9-1

NOTE: If the circuit tester is not sufficientlly accurate, it may not show the values given and may give erroneous readings.
Erroneous readings will also occur when there is a wide variation of resistance among coil windings or when measurement is performed at ambient temperatures different from 20°C (68°F).

9-5 ROTOR ASSEMBLY

1) Using the circuit tester, measure the resistance of the field coil.

(R x 1Ω ±10%)

MODEL	RGD2500	RGD3300
Resistance	3.7Ω	3.3Ω

Table 9-2

NOTE 1: Measure the resistance of each coil winding while the diode and each resistor are disconnected with their solder removed.

NOTE 2: If the circuit tester is not sufficiently accurate, it may not show the values given and may give erroneous readings.
Erroneous reading will also occur when there is a wide variation of resistance among coil windings or when measurement is performed at ambient temperatures different from 20°C (68°F).

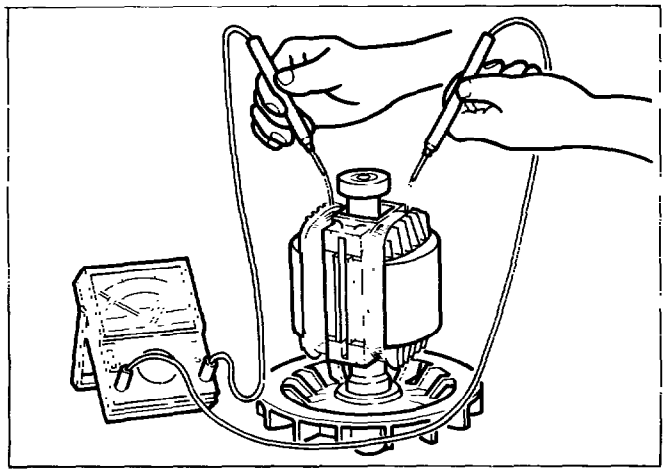


Fig. 9-5

9-6 CONDENSER

- If an instrument (QC-meter or C-meter) for measuring capacity of condender is available, check the capacity of condenser. (See Fig. 9-6.)

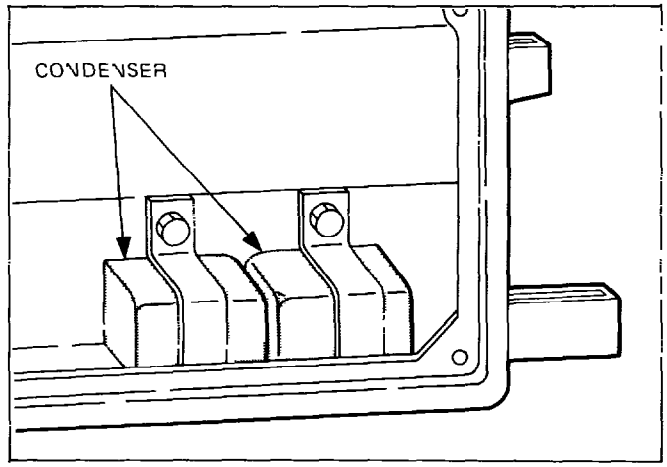


Fig. 9-6

- NORMAL CAPACITY OF CONDENSER

NODEL		RGD2500	RGD3300
CAPACITY	①	10μF	10μF
	②	10μF	10μF

Table 9-3

- If such an instrument is unavailable, the condenser can be checked by replacing with a new one. If the generator performs good with new condenser, the cause of trouble is defect in original condenser.

9-7 DIODE RECTIFIER

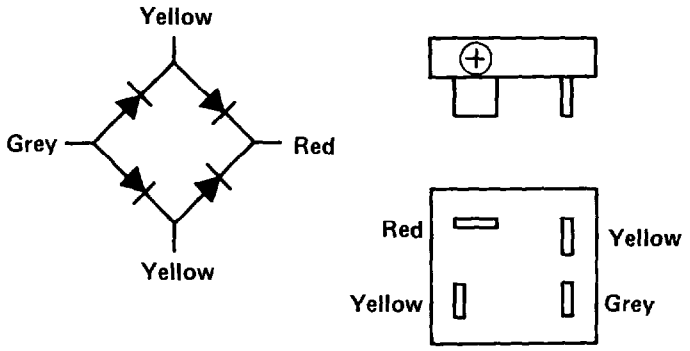


Fig. 9-7

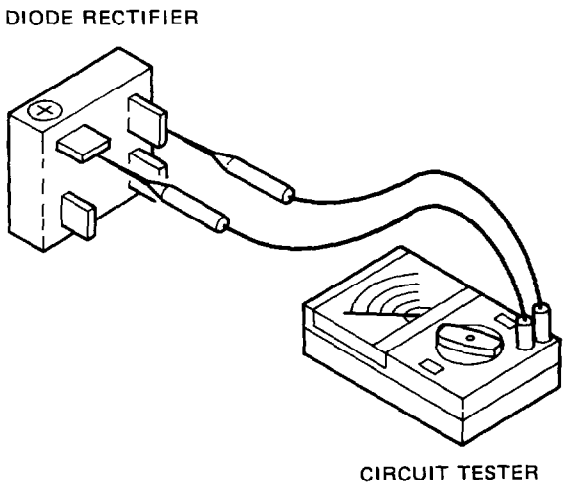


Fig. 9-8

Circuit inside of the diode rectifiers is as shown in Fig. 9-7. Check continuity between each terminal by using a circuit tester as shown in Fig. 9-8. The rectifier is normal when continuity is as follows:

		Apply black ⊖ needle of the circuit tester			
		Yellow	Yellow	Red	Grey
Apply red ⊕ needle of the circuit tester	Yellow		No continuity	No continuity	Continuity
	Yellow	No continuity		No continuity	Continuity
	Red	Continuity	Continuity		Continuity
	Grey	No continuity	No continuity	No continuity	

Table 9-4

NOTE 1: In checking the diode, direction of connection is contrary to the ordinary case because of characteristics of the diode and battery incorporated in the tester.

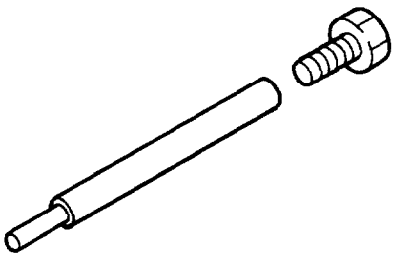
NOTE 2: "Continuity" means forward direction characteristics of the diode, and different from short circuit condition (in which a pointer of the tester goes out of its normal scale), shows resistance to some extent. When results of the checking indicates failure even in one section, replace with a new one.

10. DISASSEMBLY AND ASSEMBLY

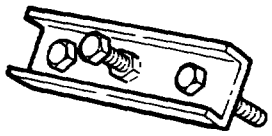
10-1 PREPARATION and PRECAUTIONS

1) Be sure to memorize the location of individual parts when disassembling the generator so that the generator can be reassembled correctly. Tie tags noted with the necessary information to facilitate easier and smoother reassembly.
2) For more convenience, divide the parts into several groups and store them in boxes.
3) To prevent bolts and nuts from being misplaced or installed incorrectly, place them temporarily back at their original position.
4) Handle disassembled parts with care: clean them before reassembly using a neutral cleaning fluid.
5) Use all disassembly assembly tools properly, and use the proper tool for each specific job.

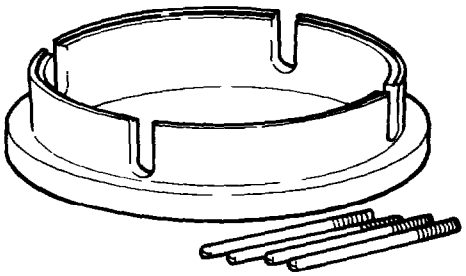
10-2 SPECIAL TOOLS for DISASSEMBLY and ASSEMBLY



ROTOR PULLER



REAR COVER PULLER



JIG

10-3 DISASSEMBLY PROCEDURES

Step	Part to remove	Description	Remarks	Tool
1	Fuel Tank	(1) Close fuel cock.	Draining tank of fuel before disassembly is unnecessary.	
		(2) Loosen the nut and remove fuel cock from the bracket. Turn the fuel cock body by 90 degrees to remove. (Fig. 10-1)		14 mm spanner
		(3) Remove the two bolts which join the fuel filter to the control box. (See Fig. 10-2.)		10 mm spanner
		(4) Remove the fuel pipe which connects fuel filter and fuel injection pump. Loosen the clamp using pliers and pull out the fuel pipe from the fuel filter. (See Fig. 10-3.)		Plier

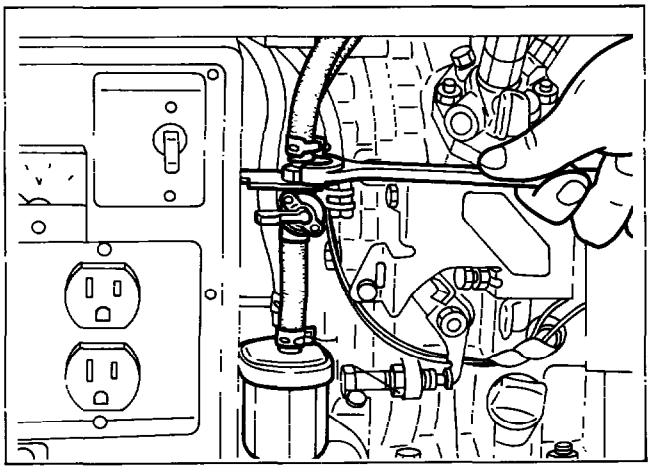


Fig. 10-1

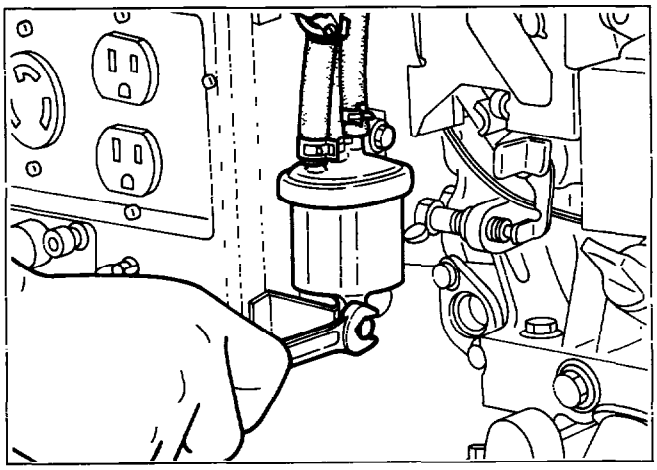


Fig. 10-2

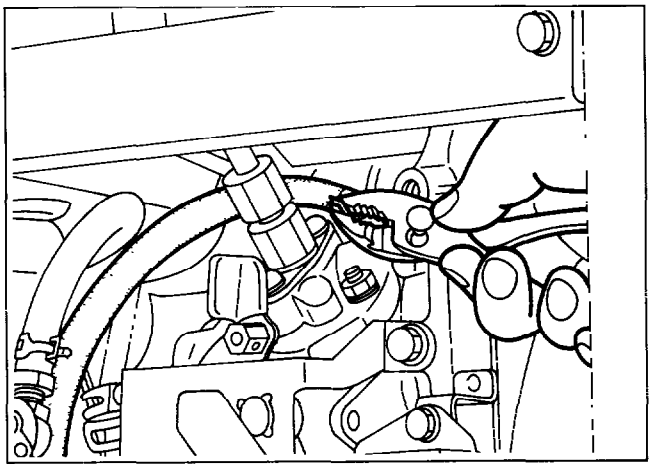


Fig. 10-3

Step	Part to remove	Description	Remarks	Tool
1	Fuel Tank	(5) Remove fuel return pipe which connects the fuel injection nozzle and the bottom of fuel tank. Loosen the clamp and pull out the fuel return pipe from the fuel injection nozzle. (Fig. 10-4)	Take care of spilt fuel from the fuel pipe.	Plier
		(6) Loosen the four bolts and remove fuel tank from frame. (See Fig. 10-5.)		10 mm spanner or box spanner

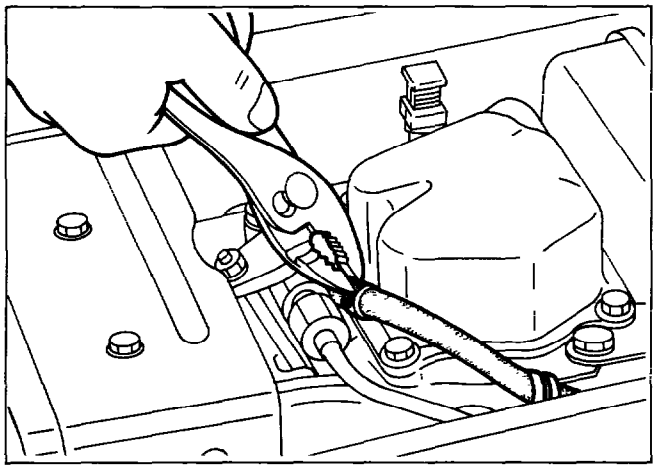


Fig. 10-4

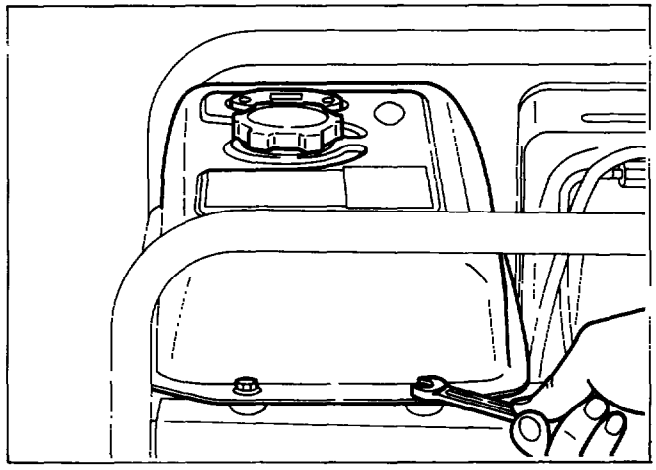


Fig. 10-5

Step	Part to remove	Description	Remarks	Tool
2	Control Box	(1) Remove control box from frame by removing the three bolts joining the control box to frame and side plate. (See Fig. 10-6.)	Wire harness is still connected.	10 mm spanner or box spanner
		(2) Put the control box with control panel down.	Put a waste cloth under the control panel to protect it.	10 mm spanner
		(3) Remove the ground wire (green/yellow) from the bottom of control box.		
		(4) Pull the bushing out from the control box. (See Fig. 10-7.)		

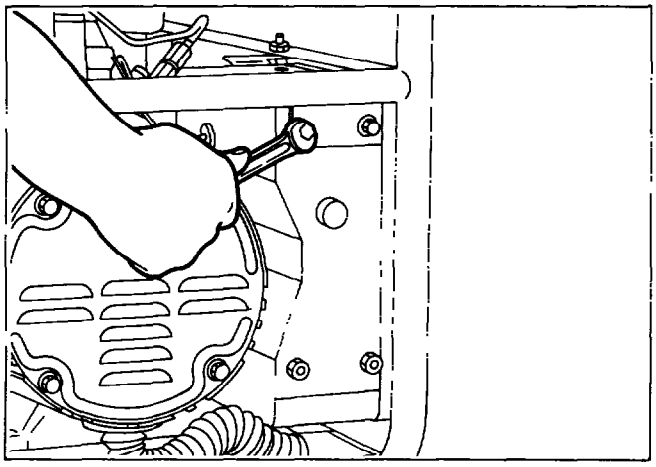


Fig. 10-6

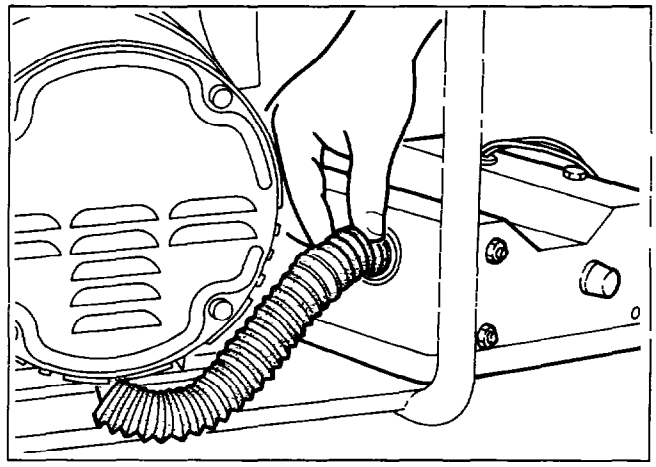


Fig. 10-7

Step	Part to remove	Description	Remarks	Tool
2	Control Box	(5) Pull the wire harness out from the control box. Disengage the connectors to separate the control box. (See Fig. 10-8.)		

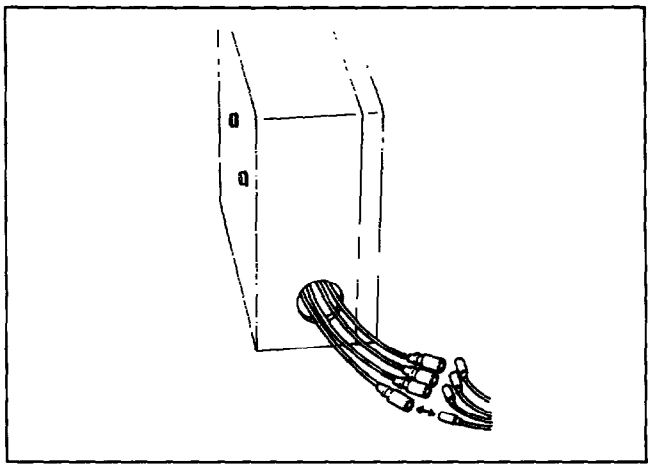


Fig. 10-8

3	Pipe Frame	(1) Remove side plate from frame. 6φ bolt . . . . . 2 pcs.		10 mm spanner or box spanner
		(2) Remove tank bracket from frame. 6φ bolt . . . . . 2 pcs.		
		(3) Remove stoppers from engine base of frame. 6φ bolt . . . . . 4 pcs.		10 mm spanner
		(4) Remove the four nuts which join the mount rubbers to the engine.		12 mm spanner
		(5) Remove the two bolts which join the rear cover to the generator base. (See Fig. 10-9.) 8φ bolt . . . . . 2 pcs.		12 mm spanner

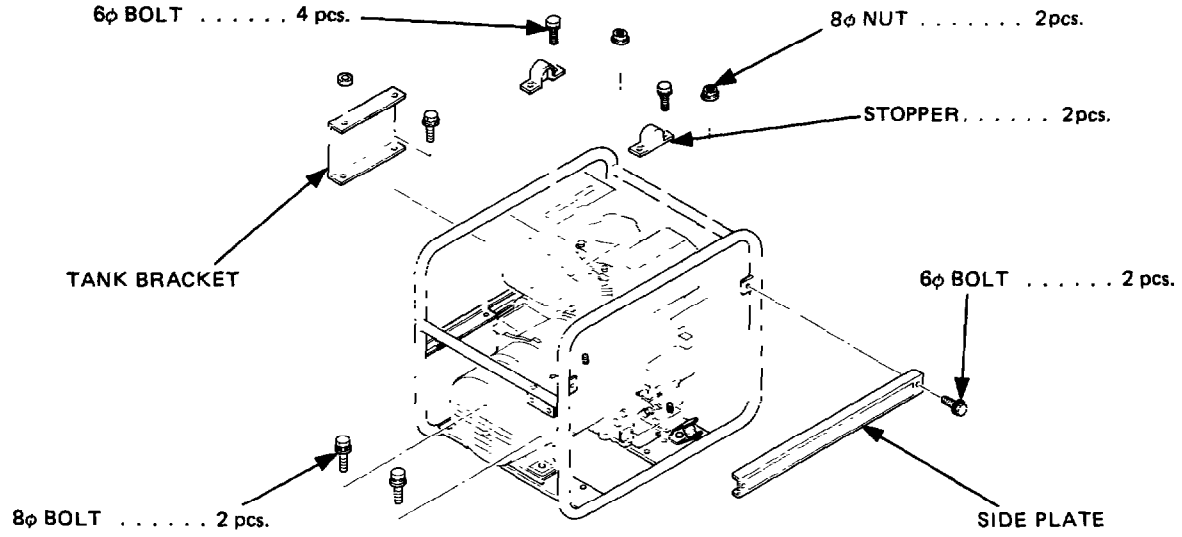


Fig. 10-9

Step	Part to remove	Description	Remarks	Tool
3	Pipe Frame	(6) Lift up the engine and alternator assembly using a chain-block, and dismount it from frame. (Fig. 10-10)		

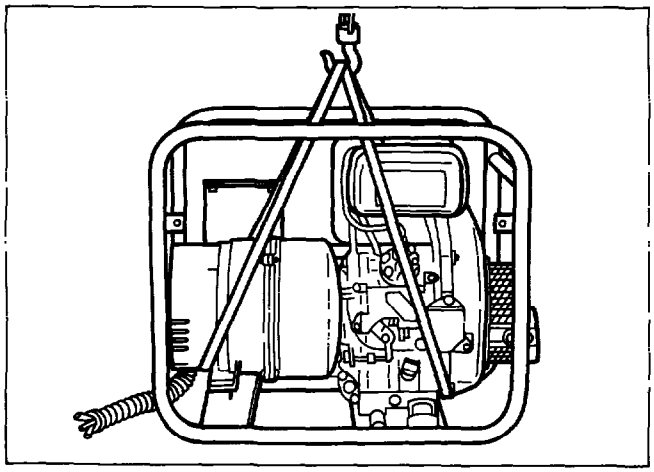


Fig. 10-10

	(7) Remove generator base from frame. 8φ nut . . . . . 1 pce.		12 mm spanner
	(8) Remove mount rubbers from frame. (See Fig. 10-11.)		12 mm spanner

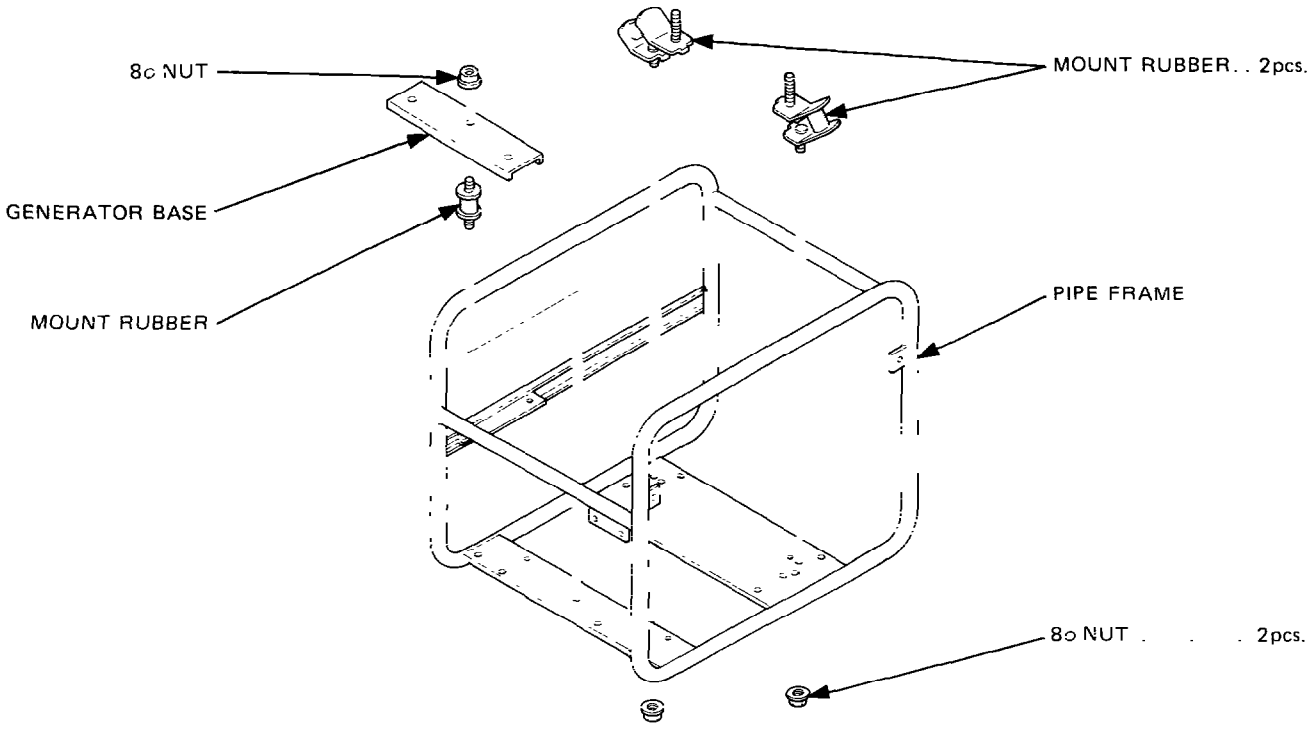


Fig. 10-11

Step	Part to remove	Description	Remarks	Tool
4	Rear Cover	(1) Remove end cover from rear cover. (See Fig. 10-12.) 6φ bolt . . . . . 4 pcs.		10 mm spanner or box wrench
		(2) Remove through bolt from rotor shaft. Apply a socket wrench on the head of through bolt and hit the wrench handle with a hammer counterclockwise to loosen. (See Fig. 10-13.)		RGD2500: 12 mm RGD3300: 14 mm Box wrench
		(3) Remove the four bolts which join the rear cover to the front cover.		
		(4) Take off the rear cover. Use the special tool "REAR COVER PULLER" to remove the rear cover. (See Fig. 10-14.) a. Insert the two bolts of the special tool into the thread holes of the rear cover. b. Apply the center bolt of the special tool to the center hole of the rotor shaft. c. Tighten the center bolt to pull out the rear cover. (See Fig. 10-15.)	Insert the two bolts sufficiently and evenly, or the thread holes may be damaged at removing.	

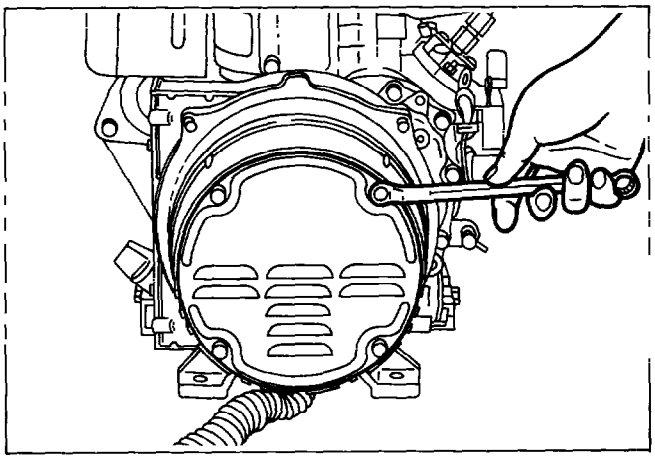


Fig. 10-12

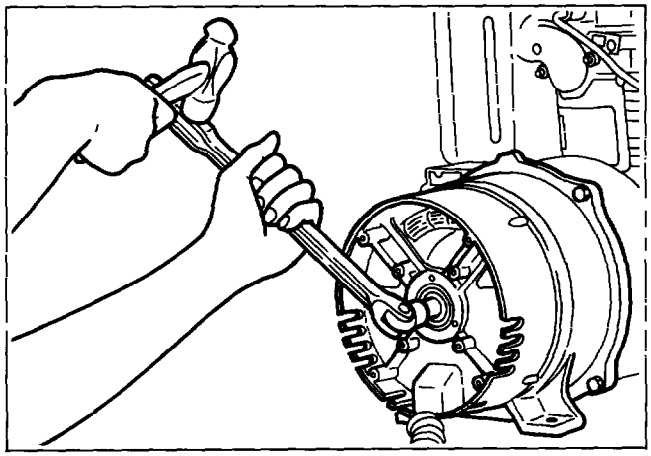


Fig. 10-13

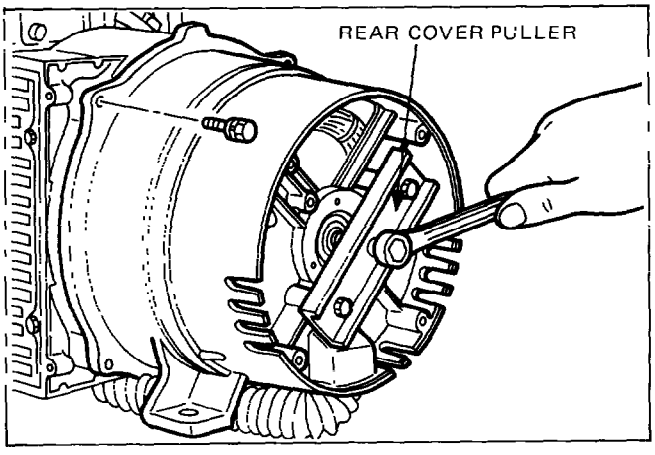


Fig. 10-14

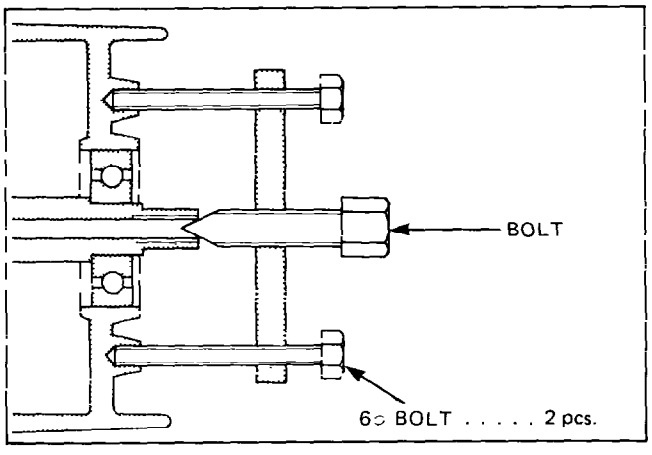


Fig. 10-15

Step	Part to remove	Description	Remarks	Tool
4	Rear Cover	In case that "REAR COVER PULLER" is unavailable, remove the rear cover by the following instructions:		
		a. Insert the through bolt into the rotor shaft and tighten lightly. b. Hit on the boss at the top of the rear cover and two legs evenly with a plastic hammer to remove. (Fig. 10-16)	Do not give a strong hit on the rear cover boss or legs.	Plastic hammer
5	Stator	(1) Remove the four bolts which join the stator to rear cover. (See Fig. 10-17.)		10 mm box wrench
		(2) *Insert a small hook into the hole inside* of the support ring and pull it out. (See Fig. 10-18.) • If a small hook is unavailable, remove the stator by the following procedure: a. Hold the rear cover and stator assembly open side down. b. Place a cushion under the stator to protect it when dropped. c. Hit on the bearing housing of rear cover with a wooden block.	Be careful not to give a damage to the stator winding.	

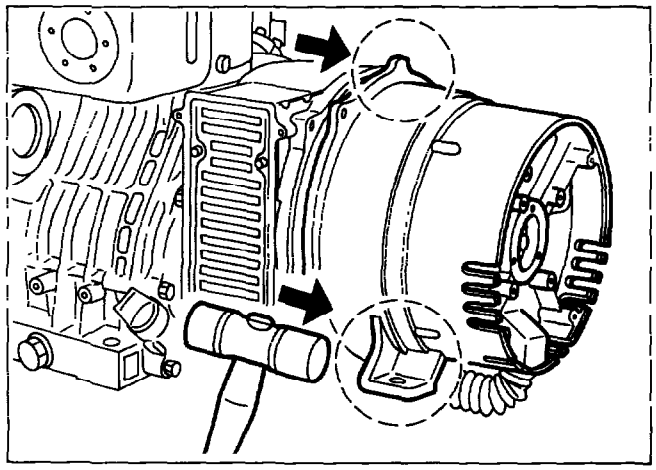


Fig. 10-16

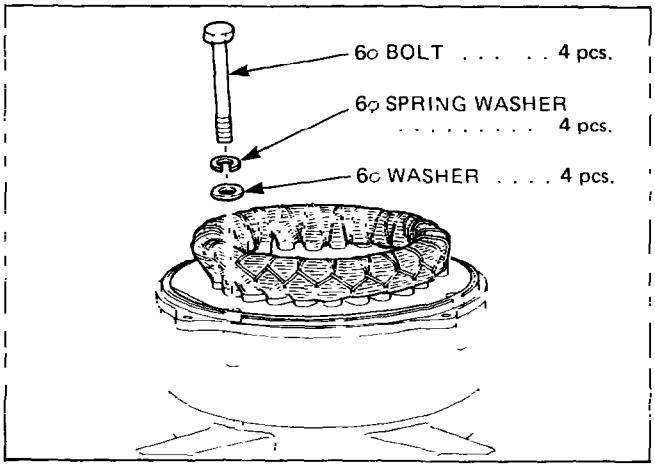


Fig. 10-17

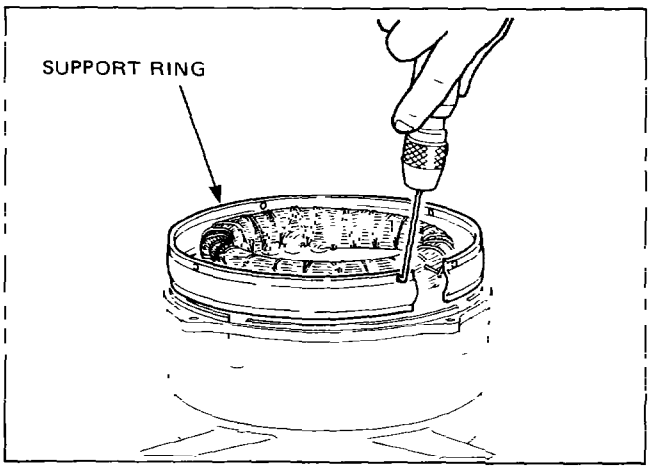


Fig. 10-18

Step	Part to remove	Description	Remarks	Tool
5	Stator	(3) Pull out the wires from rear cover. (See Fig. 10-19.)		

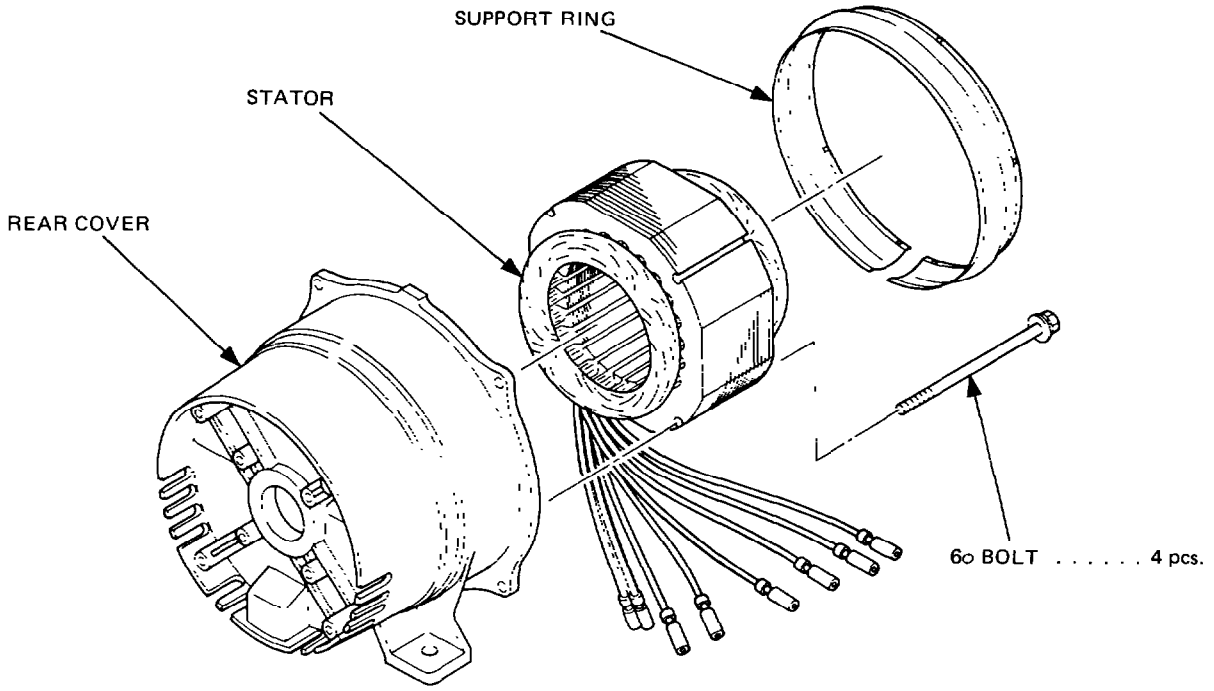


Fig. 10-19

6	Rotor	(1) Insert the rotor-puller shaft into the rotor and tighten the rotor-puller bolt until the rotor comes loose. (See Fig. 10-20.) If the special tool (rotor-puller) is unavailable, take the following instructions to remove the rotor: Lightly strike the rotor core with a plastic hammer in many directions and pull out the rotor from engine shaft. (See Fig. 10-21.)	Take utmost care not to strike on the rotor winding or plastic insulator or permanent magnets.	Rotor puller RGD2500: 14 mm RGD3300: 17 mm Spanner Plastic hammer

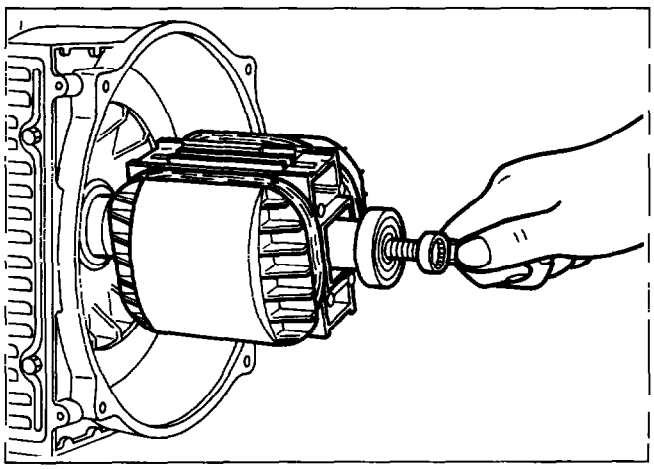


Fig. 10-20

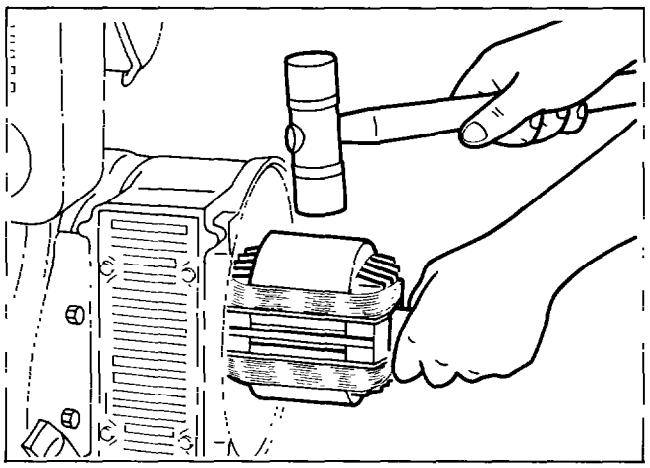


Fig. 10-21

Step	Part to remove	Description	Remarks	Tool
7	Front cover and Front. Protector	(1) Remove the four bolts which join the front cover to the engine. 8ϕ bolt . . . . . 4 pcs.		12 mm spanner
		(2) Remove front protector from front cover. (See Fig. 10-22.)		8 mm spanner or screw driver (+)

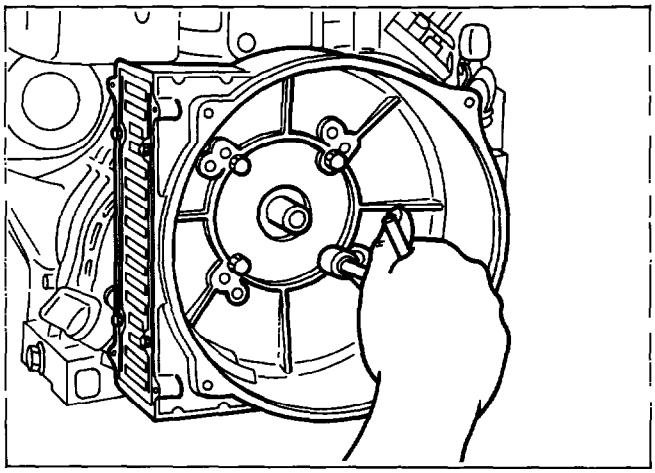


Fig. 10-22

10-4 ASSEMBLY PROCEDURES

10-4-1 FRONT PROTECTOR and FRONT COVER

(1) Attach the front protector to front cover.
The louvers of the front protector project into the inside of front cover as shown in Fig. 10-23.
5ϕ x 10 mm Tapping screw ..... 4 pcs.
Tightening torque: 35 ~ 55 kg-cm

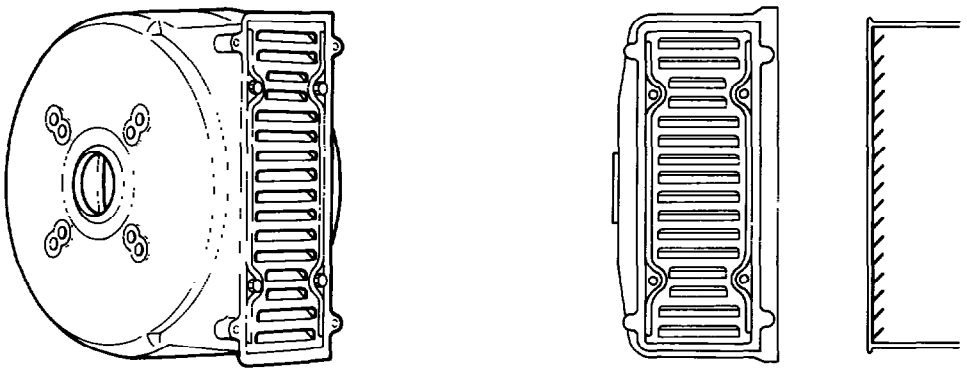


Fig. 10-23

(2) Install front cover to the engine.
(See Fig. 10-24.)
8ϕ x 20 mm bolt and washer assy
..... 4 pcs.
Tightening torque: 120 ~ 140 kg-cm

NOTE: The size of faucet joint and pitch of mounting holes of front cover is different by models RGD2500 and RGD 3300.

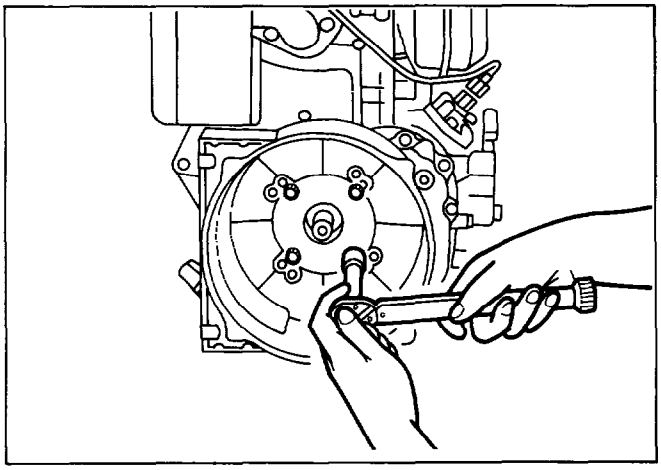


Fig. 10-24

10-4-2 ROTOR

(1) Clean the tapered portion of driving shaft and the matching tapered hole of rotor shaft of oil and dirt using a waste cloth.

(2) Attach rotor to the driving shaft. (See Fig. 10-25.)
Tighten through bolt with washer and spring washer.
Tightening torque:
RGD2500 ..... 115 ~ 135 kg-cm
RGD3300 ..... 230 ~ 250 kg-cm

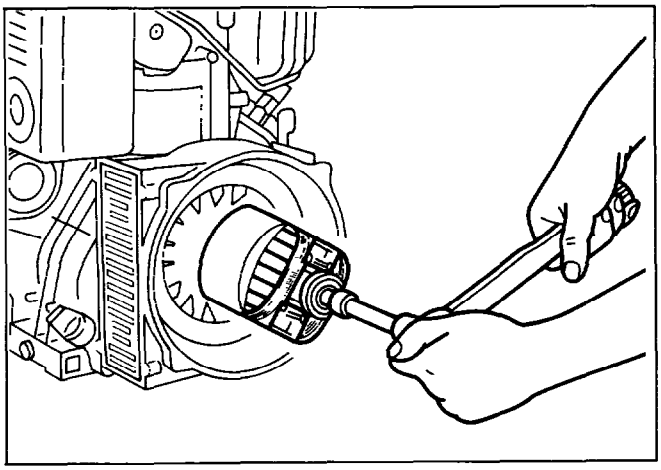


Fig. 10-25

10-4-3 STATOR and REAR COVER

(1) Set the stator on the jig.
Match the grooves of the stator with the grooves of the jig.

(2) Attach the support ring around the stator setting the open ends of the ring to the position of stator leads.
Check that the hooking holes are placed at the flat sides of the stator. (See Fig. 10-26.)

(3) Insert four guide bolts into the bolt holes of the rear cover and mount it on the stator matching the guide bolts with the grooves of the stator.
Tighten the guide bolts tentatively.

(4) Take the stator leads out from the window of the rear cover.

(5) Put a board on the rear cover and press it using a pressing machine.
If a pressing machine is unavailable, tap around the board on the rear cover evenly with a plastic hammer to press fit the rear cover over the stator. (See Fig. 10-27.)

CAUTION: Take care of the rear cover to be pressed in upright position.

(6) Join the stator to rear cover with four bolts, washers and spring washers. (See Fig. 10-28.)
6φ bolt . . . . . 4 pcs.
6φ washer . . . . . 4 pcs.
6φ spring washer . . . . . 4 pcs.
Tightening torque: 80 ~ 100 kg-cm

NOTE: Tighten four bolts evenly taking several steps.

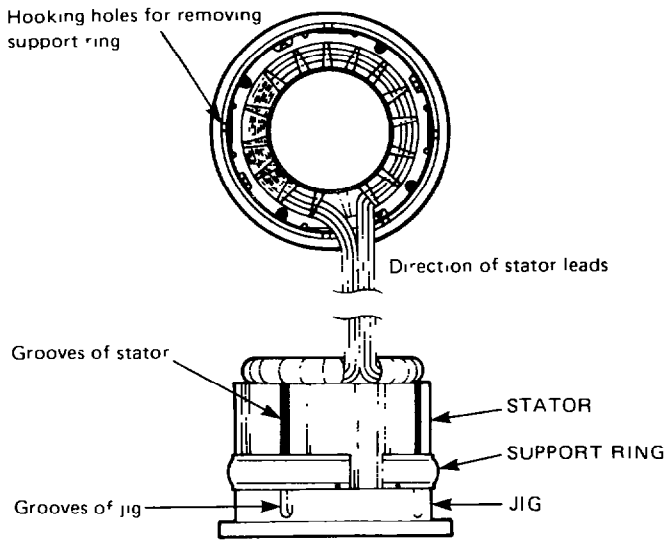


Fig. 10-26

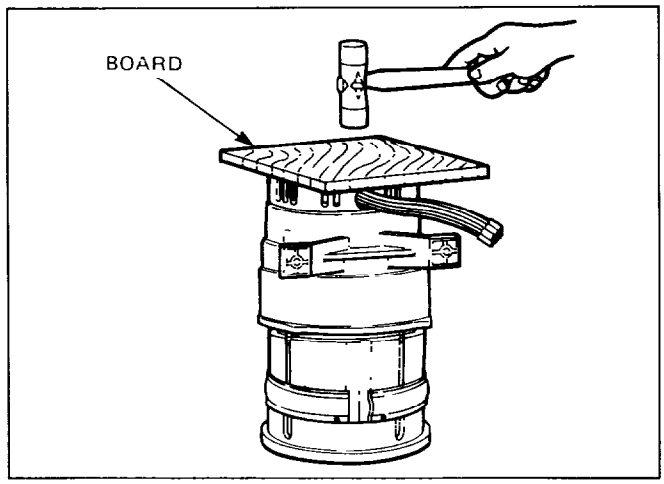


Fig. 10-27

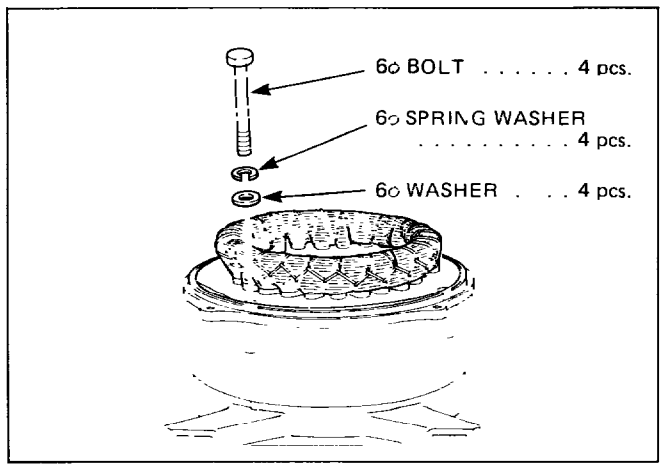
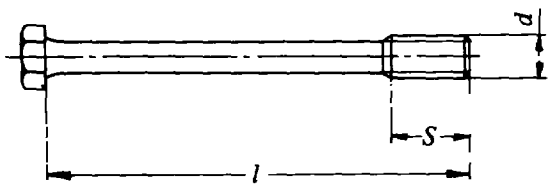


Fig. 10-28

- The dimensions of the stator bolts are shown in Table 10-1.



Model		*l*	*s*	*d*
RGD2500	(mm)	85	40	6
	(inch)	3.35	1.57	0.24
RGD3300	(mm)	95	40	6
	(inch)	3.74	1.57	0.24

Table 10-1

(7) Attach the boot over the lead wires drawn out from the rear cover.
Press the smaller end of boot into the rear cover. (See Fig. 10-29.)

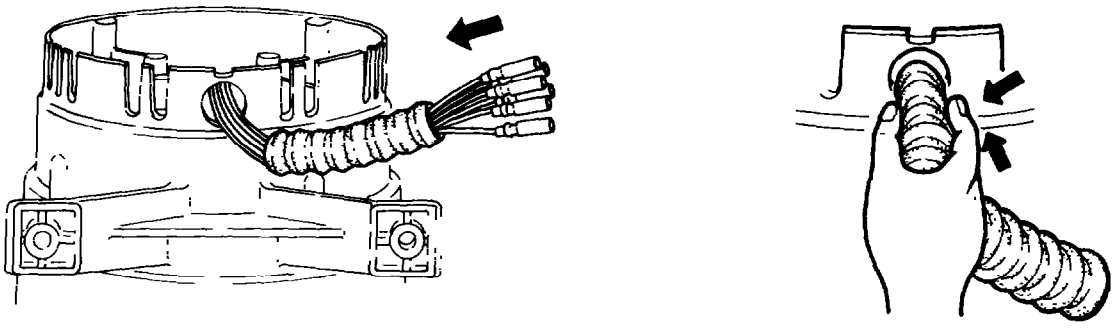


Fig. 10-29

(8) Put the rear cover and stator assembly over the rotor.
Tap on the rear cover evenly with a plastic hammer to press the rotor bearing into the rear cover. (See Fig. 10-30.)

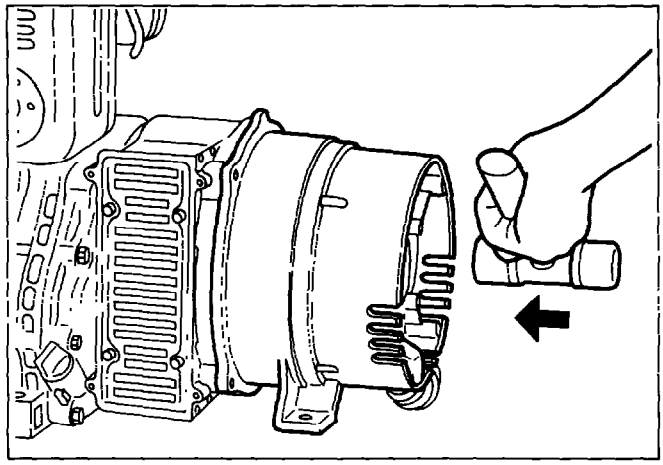


Fig. 10-30

(9) Tighten the four bolts, washers and spring washers to join the rear cover to the front cover.

6ϕ x 25 mm bolt ..... 4 pcs.
6ϕ washer ..... 4 pcs.
6ϕ spring washer ..... 4 pcs.
Tightening torque: 50 ~ 60 kg-cm

In the case of models with oil sensor or electric starter, attach the clamp at the same time. (See Fig. 10-31.)

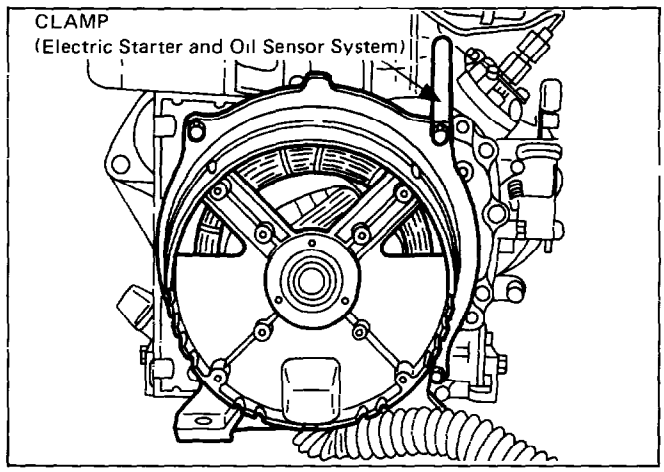


Fig. 10-31

10-4-4 END COVER

Attach end cover to the rear cover.
The air-inlets of the end cover have to face downward. (See Fig. 10-32.)

6ϕ x 8 mm flange bolt ..... 4 pcs.
Tightening torque: 40 ~ 60 kg-cm

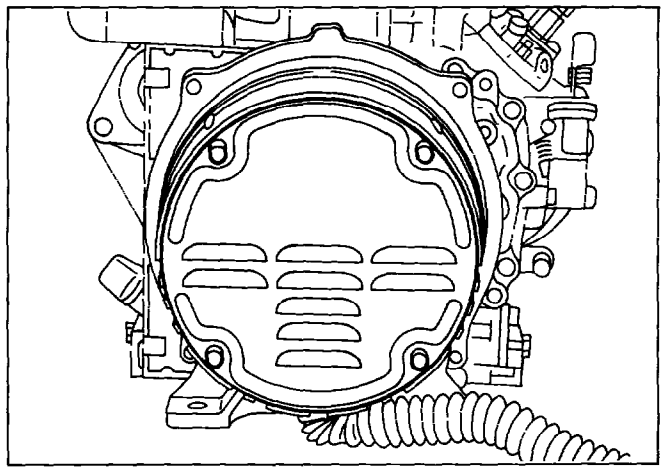


Fig. 10-32

10-4-5 FRAME

(1) Attach two mount rubbers to the engine base of the frame. Tighten the nuts from the bottom side of the frame. (See Fig. 10-34.)

8ϕ flange nut ..... 2 pcs.
Tightening torque: 120 ~ 140 kg-cm

(2) Attach the 5ϕ terminal of grounding wires (green/yellow) to the unpainted thread hole of the frame base plate using a 5 mm brass screw. (See Fig. 10-33.)

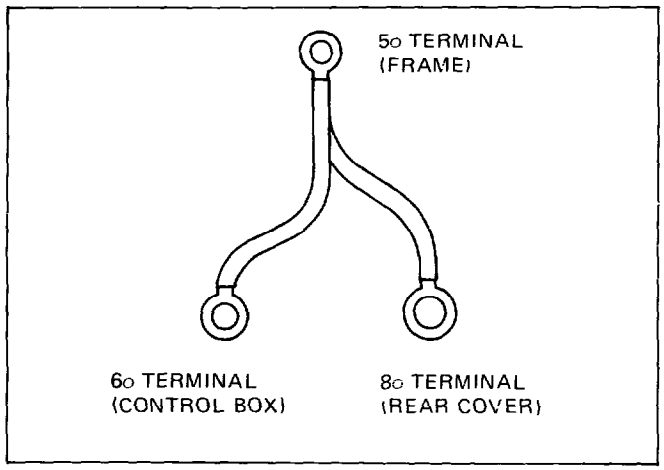


Fig. 10-33

(3) Attach the alternator mount rubber to the frame. (See Fig. 10-34.)

NOTE: The mount rubbers are selected to reduce vibration most effectively by model and its frequency.
Be sure to use the correct mount rubber for your generator.

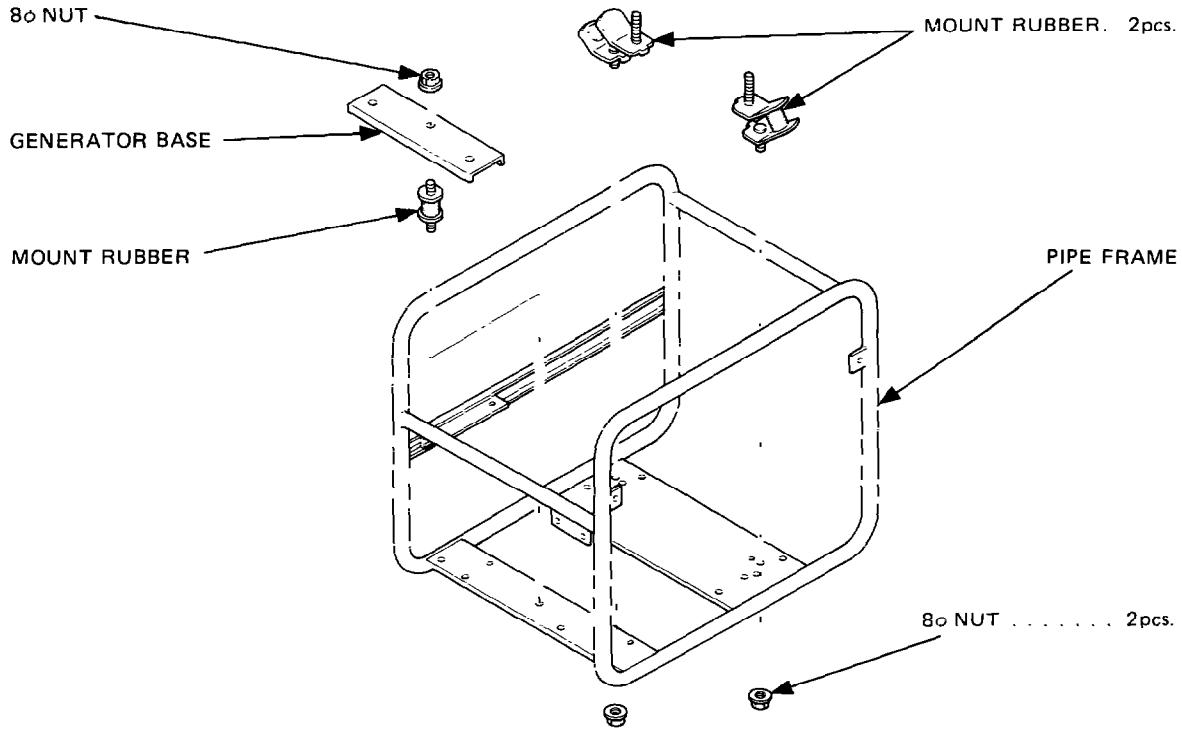


Fig. 10-34

(4) Mount the GENERATOR BASE on the mount rubber attached to the frame at step (3). (See Fig. 10-35.)

8ϕ flange nut . . . . . 1 pce.
Tightening torque: 120 ~ 140 kg-cm

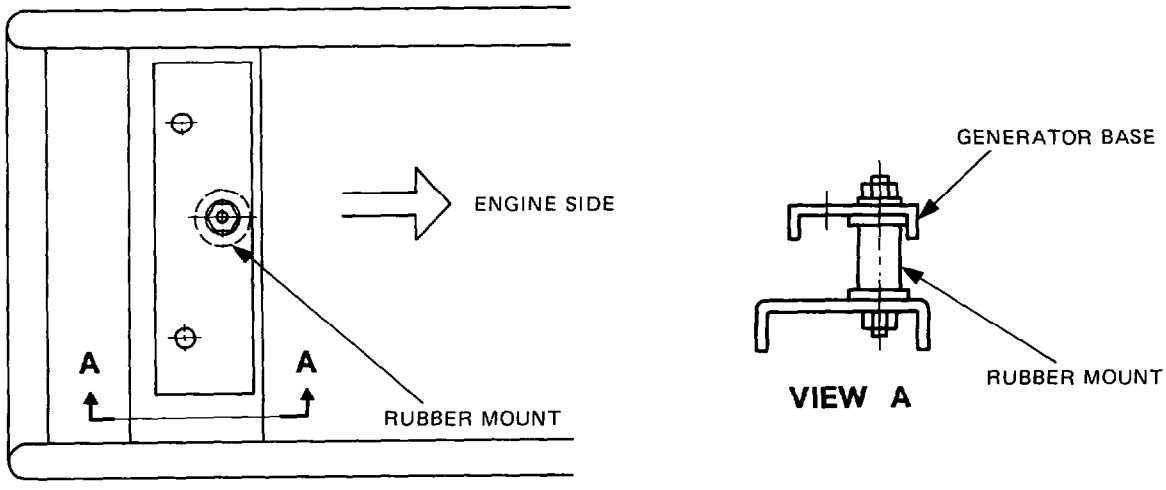


Fig. 10-35

(5) Attach SHAFT (STOPPER) to the bottom of engine crankcase.
Tighten nuts tentatively.

NOTE: Pay attention to the position of the SHAFT (STOPPER).
The flange nuts shall be tightened after fine adjustment.

(6) Cover the both ends of SHAFT (STOPPER) with RUBBERs. Push RUBBERs until they touch the crankcase. (See Fig. 10-36.)

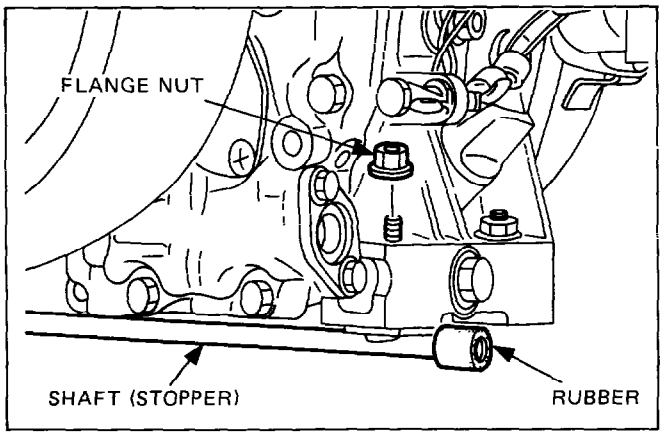


Fig. 10-36

(7) Lift engine and alternator assembly with a chain block and mount it to the frame.
Down the alternator first then the engine into the frame.
Lift the engine by approx. 25 mm so as not to apply weight to the engine mount rubbers.
(See Fig. 10-37.)

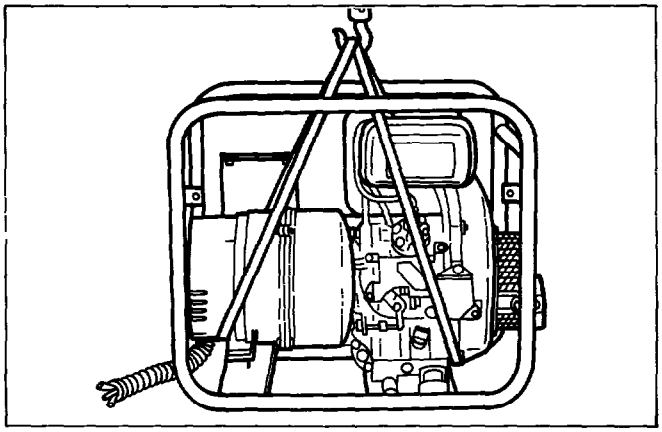


Fig. 10-37

(8) Fix the legs of rear cover to the generator base.
Attach the 8ϕ terminal of the grounding wires and the clamp to the right side leg of the rear cover at the same time.
In the case of electric starting model, attach the 8ϕ terminal of the grounding wires, a clamp and the BATTERY CABLE (–) to the right side leg and a clamp to the left side leg of the rear cover at the same time. (See Fig. 10-38.)

NOTE: Two nuts are welded to the bottom side of the GENERATOR BASE.

8ϕ x 25 mm bolt & washer assy . . . . 2 pcs.
Tightening torque: 120 ~ 140 kg-cm

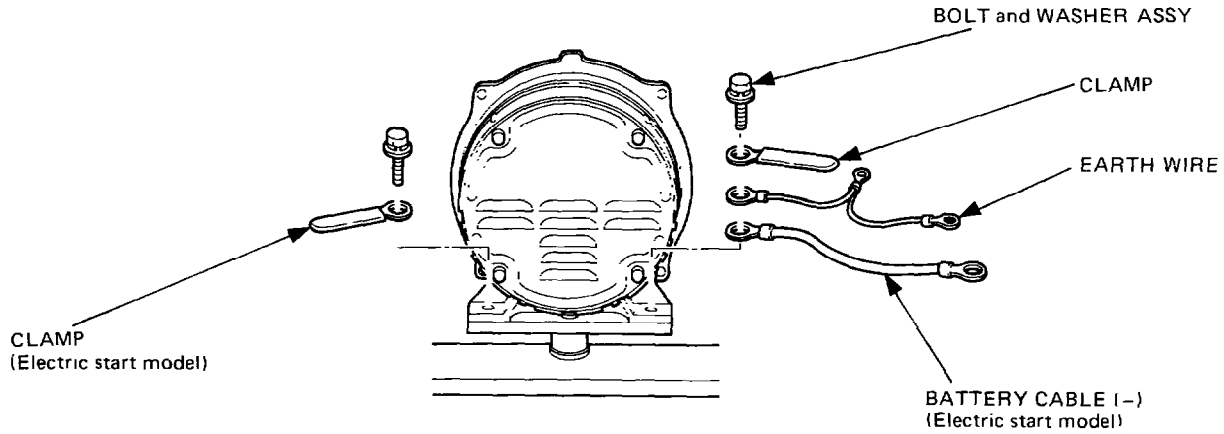


Fig. 10-38

(9) Fix the engine mount rubbers to the crankcase base.

8ϕ flange nut ..... 2 pcs.
Tightening torque: 120 ~ 140 kg-cm

CAUTION: Pay attention to the position of the mount rubbers.

Lift down the engine and alternator assembly and remove the chain block belt.

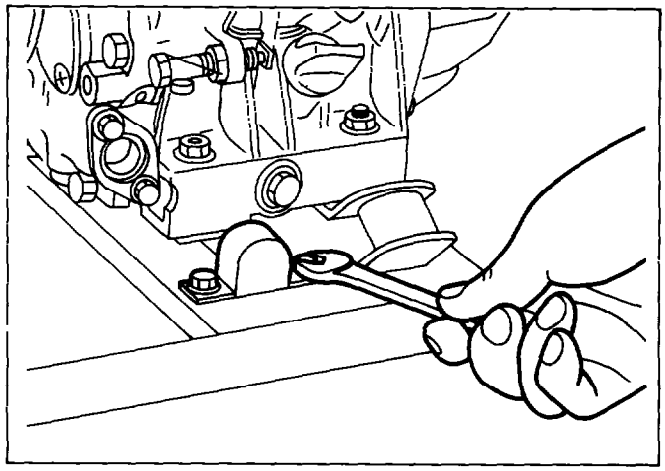


Fig. 10-39

(10) Attach two STOPPERs to the frame covering the both ends of the SHAFT (STOPPER). (See Fig. 10-39.)

6ϕ x 16ϕ flange bolt ..... 4 pcs.
Tightening torque: 50 ~ 60 kg-cm

(11) Adjust the position of SHAFT (STOPPER) so as its both ends are placed in the center of the STOPPERs, then tighten the flange nuts to fix the SHAFT (STOPPER). (See Fig. 10-40.)

Tightening torque: 120 ~ 140 kg-cm

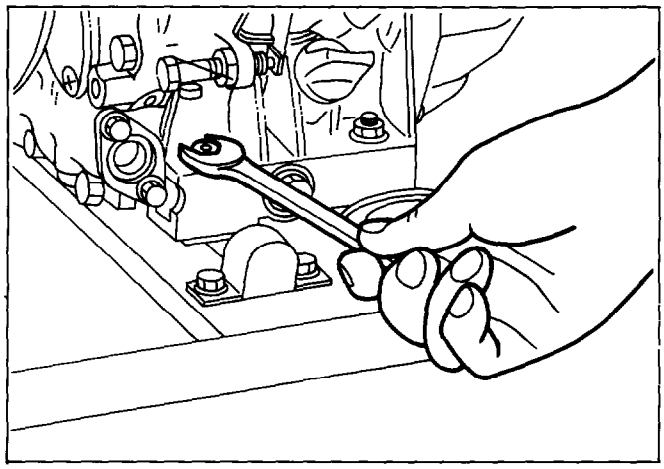


Fig. 10-40

(12) Attach the SIDE PLATE to the frame. (See Fig. 10-41.)

Tighten the two black flange bolts tentatively.

6ϕ x 8 mm flange bolt (black) ..... 2 pcs.

NOTE: The flange bolts shall be tightened after the installation of the control box.

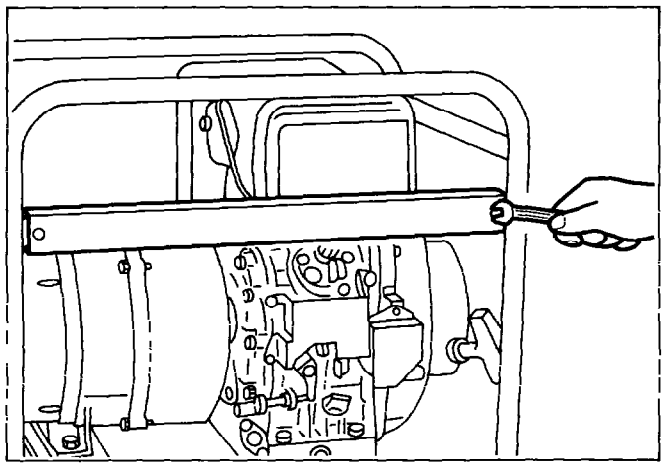


Fig. 10-41

10-4-6 CONTROL BOX

Mount the control box assembly to the frame.
Refer to Section 10-5 for disassembly, checking and reassembly procedures of the control box.

(1) Attach the 6ϕ terminal of the grounding wires to the bottom of the control box.
(See Fig. 10-42.)
6ϕ nut (brass) ..... 1 pce.
Tightening torque: 50 ~ 60 kg-cm

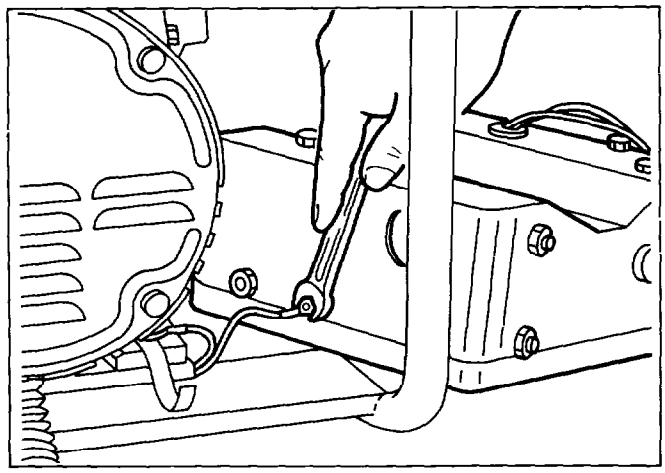


Fig. 10-42

(2) In the case of generator models equipped with oil sensor, connect the wires to oil pressure switch and solenoid.
- Screw the black/yellow wire to the center of the oil pressure switch.
- Connect the two blue wires to the solenoid and clamp the connectors to the side of speed control unit.

(3) Connect the wires drawn out from the stator to the wires from the control box.

NOTE 1: Connect the wires of the same color.
NOTE 2: On 220V and 240V models, connect one blue stator lead with a white control box lead.
NOTE 3: Engage the connectors securely.

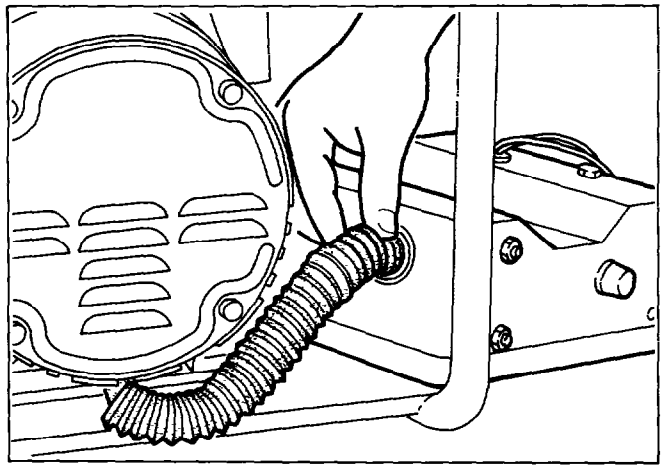


Fig. 10-43

(4) Push the wires into the control box and attach the bushing over the wires.
Press the upper end of the bushing into the control box. (See Fig. 10-43.)

(5) Install the control box to the frame.
6ϕ x 16 mm flange bolt ..... 2 pcs.
6ϕ x 12 mm flange bolt ..... 1 pce.

1 Tighten the above three bolts tentatively.
2 Tighten the two black bolts which join the side plate to the frame.
3 Tighten the above three bolts adjusting the position of the control box. (See Fig. 10-44.)
Tightening torque: 50 ~ 60 kg-cm

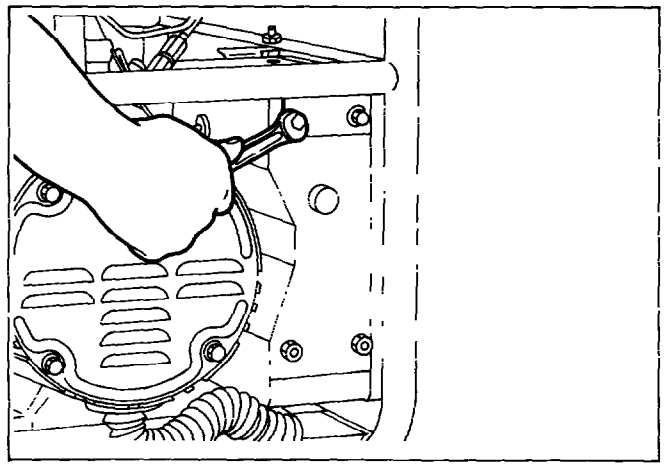


Fig. 10-44

< Electric start model >

(6) Connect the light green and the pink leads of the control box to the starting motor.
Connect the pink lead to the terminal of the motor and attach the light green lead together with the BATTERY CABLE (+) to the 6 mm bolt of the motor.

(7) Clamp the wires of starting motor and oil sensor at the rear panel of control box, main bearing cover and front cover. (See Fig. 10-45.)

NOTE: Take a enough margin in the length of wires between control box and alternator to allow the move of rubber mounted alternator.

Clamp the BATTERY CABLE (+) to the left side leg of the rear cover.

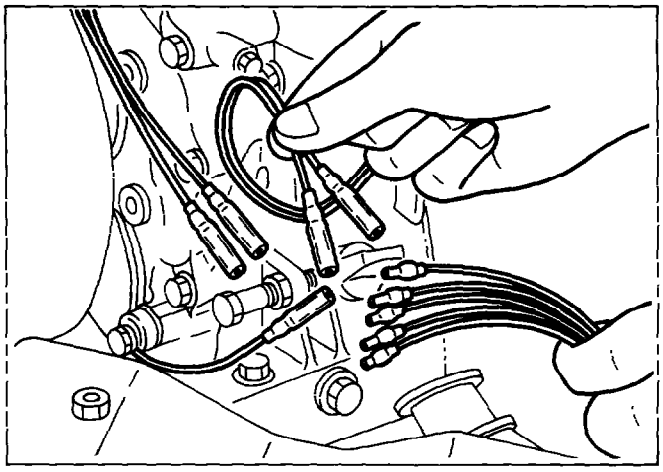


Fig. 10-45

10-4-7 FUEL TANK

(1) Attach the BRACKET (TANK) to the frame. (See Fig. 10-46.)
6ϕ x 16 mm flange bolt ..... 2 pcs.
Tightening torque: 50 ~ 60 kg-cm

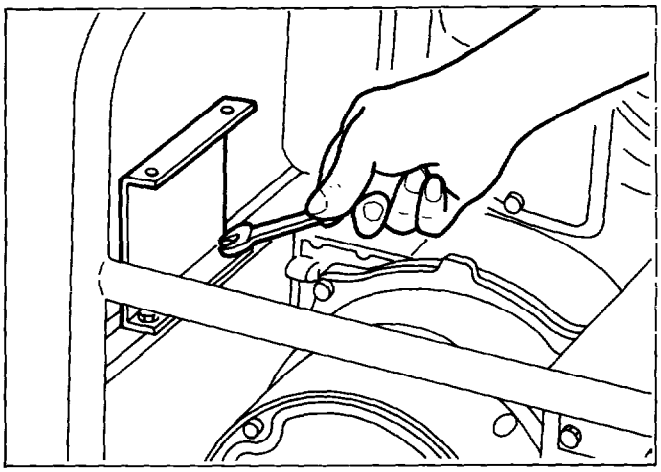


Fig. 10-46

(2) Connect fuel pipes to the bottom of the fuel tank. Be careful of the direction of the BANJO. (See Fig. 10-47.)

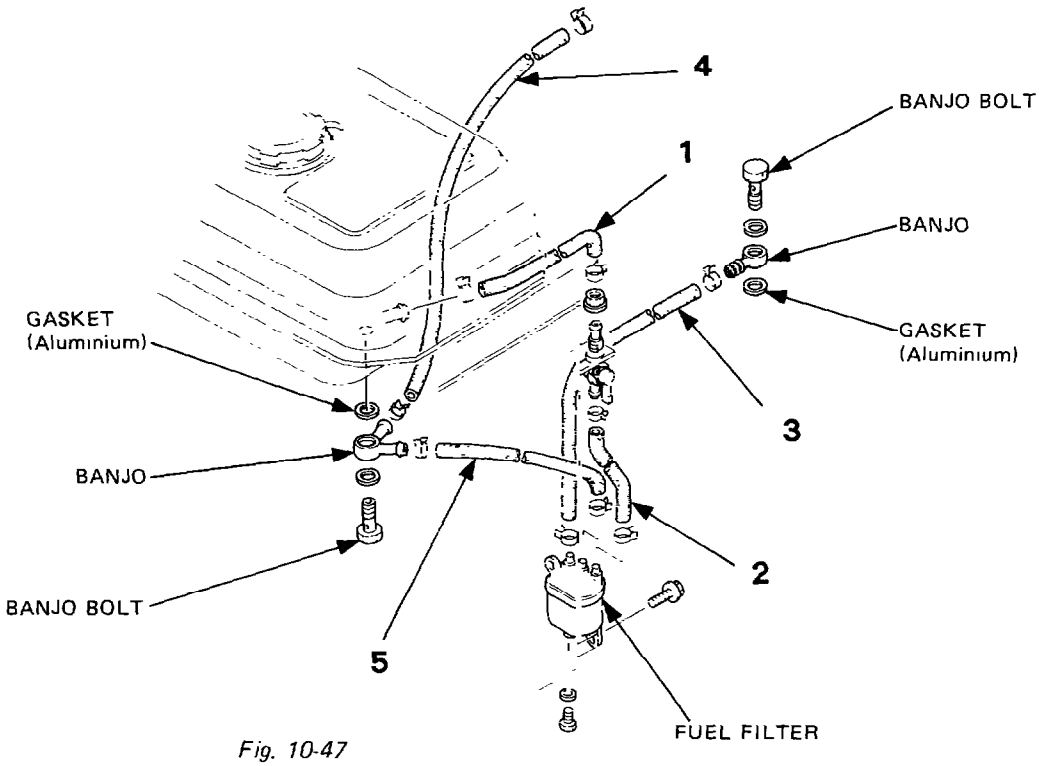


Fig. 10-47

Ref. No.	Part Name	Outer Dia.	Inner Dia.	Length
1	FUEL PIPE	12 mm	6 mm	175 mm
4	FUEL PIPE	9 mm	4.5 mm	350 mm
5	FUEL PIPE	9 mm	4.5 mm	260 mm

Table 10-2

Use the correct clamps for each fuel pipe.

(3) Mount the fuel tank on the frame.
Apply RUBBER (TANK)s between side plate and tank. and bracket (tank) and tank.
(See Fig. 10-48.)
Use black flange bolts to join them.
6ϕ x 18 mm flange bolt (black) .... 4 pcs.
Tightening torque: 30 ~ 40 kg-cm

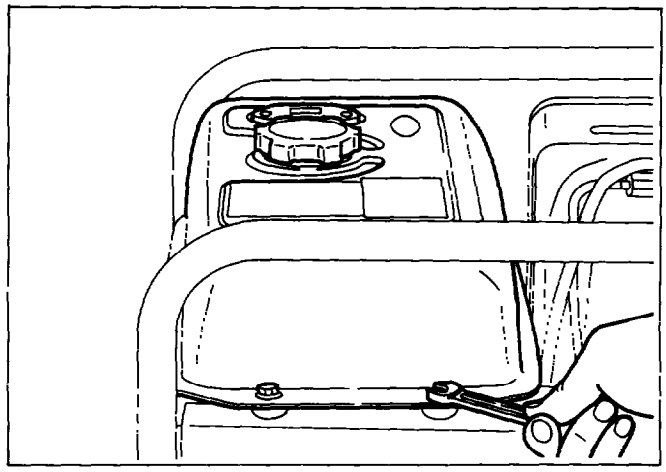


Fig. 10-48

(4) Connect fuel pipes between fuel tank, fuel cock, fuel filter and fuel injection pump. (See Fig. 10-47.)
Attach the 10 mm flange nut to the fuel cock before connect the fuel pipe to it.
Use the correct clamps for each fuel pipe.

Ref. No.	Part Name	Outer Dia.	Inner Dia.	Length
2	FUEL PIPE	12 mm	6 mm	70 mm
3	FUEL PIPE	12 mm	6 mm	230 mm

Table 10-3

(5) Attach fuel cock and fuel filter to the control box.
The fuel cock can be installed on the bracket by turning it 90 degrees with fuel pipes connected.
Fuel cock
10ϕ flange nut ..... 1 pce.
Tightening torque: 50 ~ 60 kg-cm
Fuel filter
6ϕ x 16 mm flange nut ..... 2 pcs.
Tightening torque: 50 ~ 60 kg-cm

10-4-8 BATTERY FRAME and BATTERY

(1) Attach BATTERY FRAMEs to the frame. (See Fig. 10-49.)
Clamp the upper end of the battery frames to the side member of the frame.
Tighten two bolt & washers tentatively.
8ϕ x 20 mm bolt & washer assy .... 2 pcs.
Join the lower end of the battery frames to the base plate of the frame.
Tighten two bolt & washers tentatively.
8ϕ x 20 mm bolt & washer assy .... 2 pcs.

(2) Mount the BATTERY BASE on the battery frame.
Insert the four bolts from the bottom of the frame and tighten the flange nuts.
6ϕ x 40 mm bolt & washer assy .... 4 pcs.
6ϕ flange nut ..... 4 pcs.
Tightening torque: 50 ~ 60 kg-cm

(3) Tighten the four bolt & washers attached at step (1).
Tightening torque: 120 ~ 140 kg-cm

(4) Mount the battery on the battery base.
Insert the battery bolts into the hooking holes of the battery base, then apply the battery stay to the battery and tighten two nuts.
6ϕ spirng washer ..... 2 pcs.
6ϕ nut ..... 2 pcs.
Tightening torque: 50 ~ 60 kg-cm

(5) Connect battery cables to the battery.
Connect the positive (+) cable first and then the negative (–) cable.

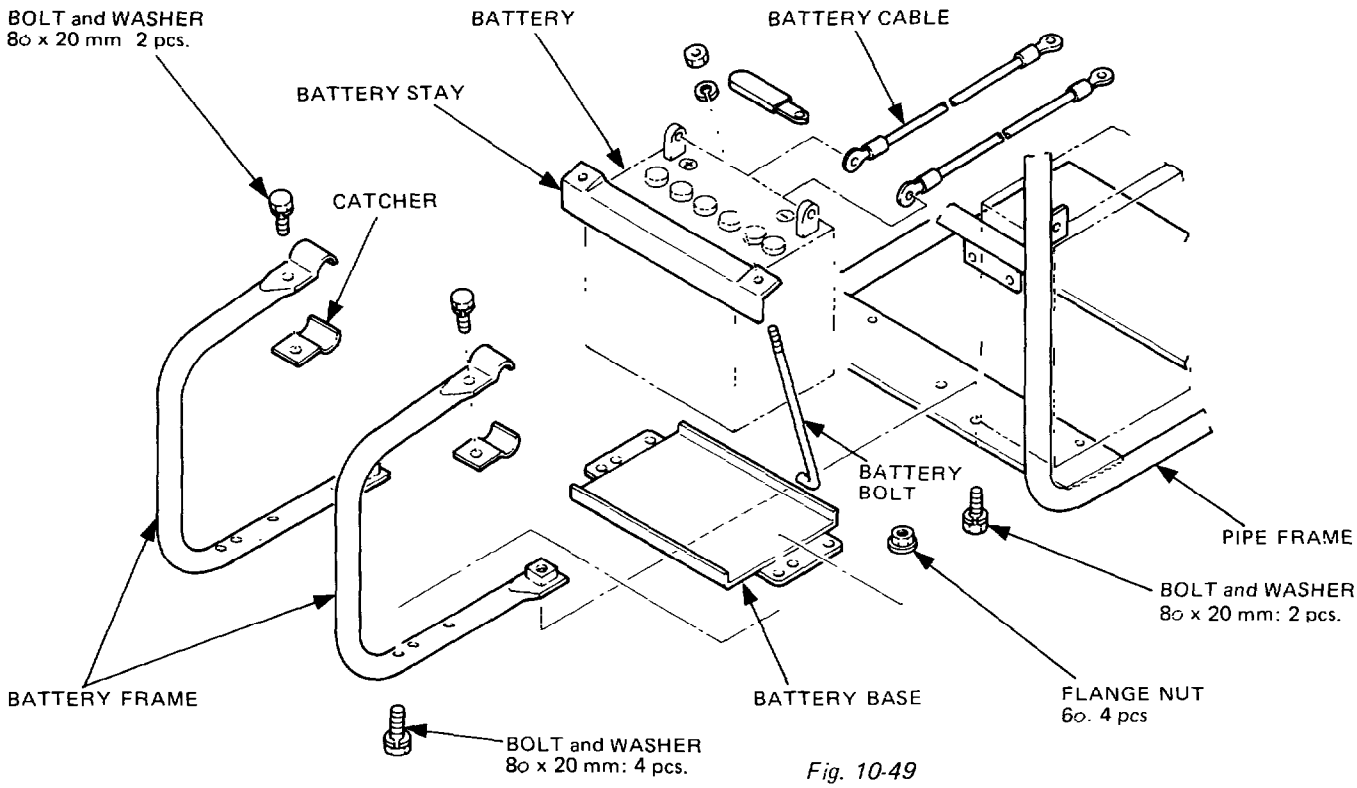


Fig. 10-49

10-5 CHECKING, DISASSEMBLY and REASSEMBLY of the CONTROL BOX

10-5-1 CHECKING OF THE CONTROL BOX

Dismount the control box from frame.
Remove the control panel and check each components and wiring.
Refer to Section 9 for the detail of checking the components in the control box.

10-5-2 DISASSEMBLY

(1) Remove the control panel from the control box.
4ϕ screw . . . . . 6 pcs.

(2) Disconnect the connectors on the wires to detach the control panel and box.

(3) Remove the regulator, oil sensor unit, condensers and diode rectifier from the control box. When removing the regulator, push the hook on the coupler and pull out to disengage the couplers. (See Fig. 10-50.)

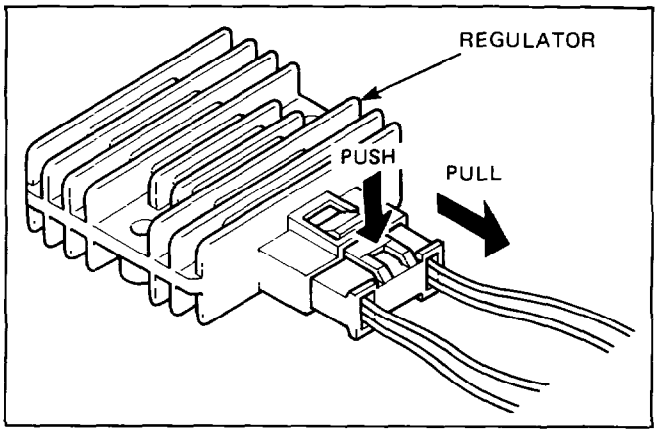


Fig. 10-50

(4) After disconnecting individual wires, remove the control panel components.

NOTE: DC fuse, full power switch, pilot lamp and warning lamp have their wires soldered. Unsolder them to remove those parts if necessary.

10-5-3 REASSEMBLY

(1) Install the receptacles, no-fuse breaker, fuse, terminals, switches, etc. on the control panel and wire them.

NOTE: Circuit diagrams are shown in Section 12. Colored wires are used for easy identification, and are of the correct capacity and size. Use heat-resistant type wires (permissible temperature range 75°C or over) in the specified gauge shown in the circuit diagrams.

(2) Install regulator, oil sensor unit, condensers, and diode rectifier into the control box.

(3) Connect the wires of control panel components and control box.
Fasten the earth wires to the rear of the control box using a 6ϕ nut to the bolt which fixes the condenser bracket to the inside of the control box. (See Fig. 10-51.)

(4) Attach the control panel to the control box.
4ϕ screw . . . . . 6 pcs.
Tightening torque . . . . . 12 ~ 15 kg-cm

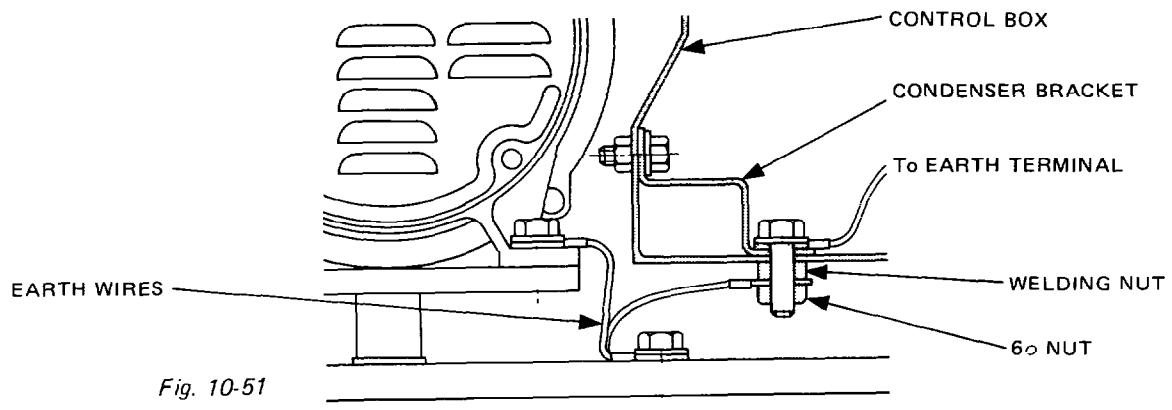


Fig. 10-51

11. TROUBLE SHOOTING

11-1 NO AC OUTPUT

11-1-1 CHECKING STATOR

- Remove control panel and disconnect black, blue, red, and white wires at the connectors.
- Measure the resistance between terminals on stator leads. (See Fig. 11-1.)
  Refer to Table 11-1 for normal resistance. If stator is faulty, replace with a new one.

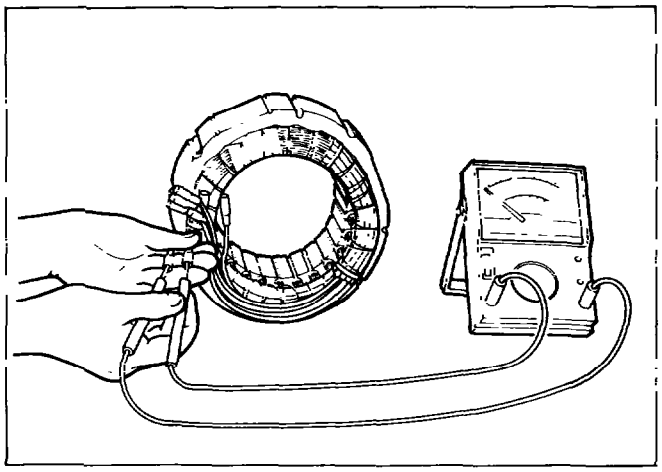


Fig. 11-1

11-1-2 CHECKING CONDENSER

- If an instrument (QC-meter or C-meter) for measuring capacity of condender is available, check the capacity of condenser. (See Fig. 11-2.)

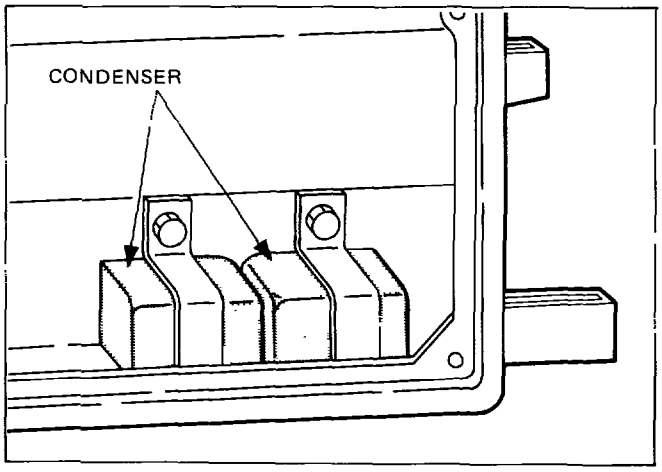


Fig. 11-2

- NORMAL CAPACITY OF CONDENSER

NODEL		RGD2500	RGD3300
CAPACITY	①	10μF	10μF
	②	10μF	10μF

Table 11-1

- If such an instrument is unavailable, the condenser can be checked by replacing with a new one. If the generator performs good with new condenser, the cause of trouble is defect in original condenser.

11-1-3 CHECKING OF ROTOR

(1) CHECKING FIELD COIL

- Measure the resistance of field coil with a circuit tester. (See Fig. 11-3.)

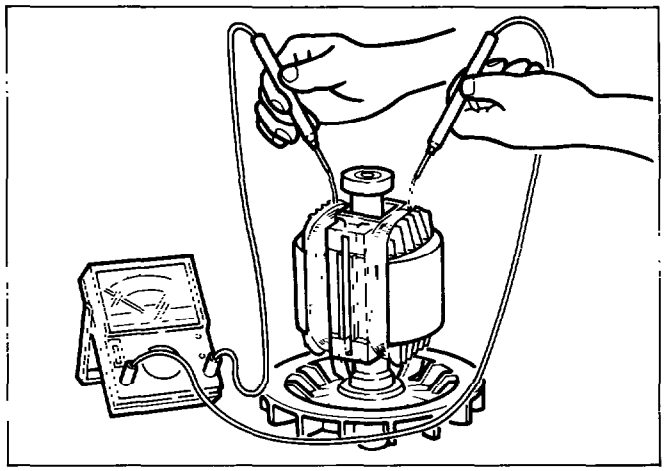


Fig. 11-3

- **NORMAL RESISTANCE**

(R x 1Ω ±10%)

MODEL	RGD2500	RGD3300
Resistance	3.7Ω	3.3Ω

Table 11-2

[Remedy]
If the resistance is not normal, replace rotor with a new one.

11-2 AC VOLTAGE IS TOO HIGH OR TOO LOW.

11-2-1 CHECKING STATOR

Check stator referring to Step 11-1-1.

11-2-2 CHECKING CONDENSER

Check condenser referring to Step 11-1-2.

11-2-3 CHECKING ROTOR

Check rotor referring to Step 11-1-3.

11-3 AC VOLTAGE IS NORMAL AT NO-LOAD, BUT THE LOAD CANNOT BE APPLIED.

11-3-1 CHECK THE ENGINE SPEED.

If the engine speed is low. adjust it to the rated r.p.m.

11-3-2 CHECK THE TOTAL WATTAGE OF APPLIANCES CONNECTED TO THE GENERATOR.

Refer to Section 7 "RANGE OF APPLICATIONS" for the wattage of the appliances.
If the generator is over-loaded. reduce the load to the rated output of the generator.

11-3-3 CHECK THE APPLIANCE FOR TROUBLE.

If the appliance is faulty, repair it.

11-3-4 CHECK IF THE ENGINE IS OVER-HEATED.

If the cooling air inlet and or cooling air outlet is clogged with dirt. grass. chaff or other debris. remove it.

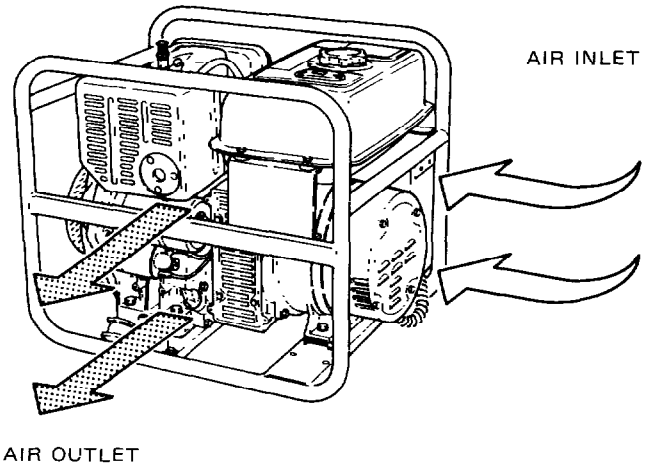


Fig. 11-4

11-3-5 CHECK THE INSULATION OF THE GENERATOR.

Stop the engine. Measure the insulation resistance between the live terminal of the receptacle and the ground terminal.
If the insulation resistance is less than 1 MΩ. disassemble the generator and check the insulation resistance of the stator. rotor and the live parts in the control box. (Refer to Section 8-3.)
Any part where the insulation resistance is less than 1 MΩ. the insulation is faulty and may cause electric leakage.
Replace the faulty part.

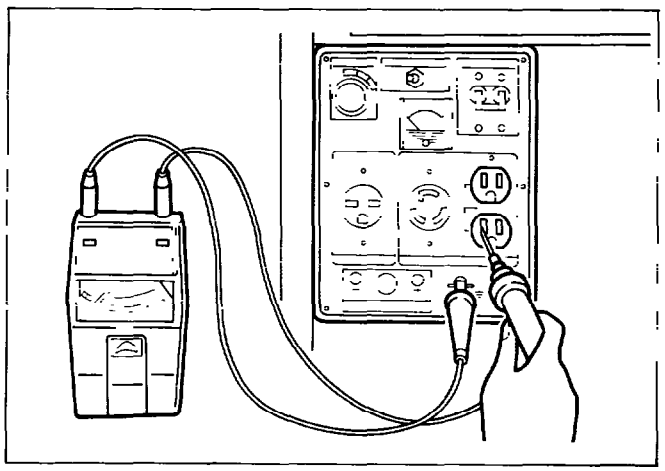


Fig. 11-5

11-4 NO DC OUTPUT

11-4-1 CHECK THE AC OUTPUT.

Check the generator by following Step 11-1-1 through Step 11-1-3.

11-4-2 CHECK THE DC FUSE.

Check the fuse in the fuse holder.
If the fuse is blown, check for the cause of fuse blowing, and then replace with a new one.

FUSE : 10A

NOTE: If the DC output is used to charge a large capacity battery or an over-discharged battery, an excessive current may flow causing fuse blow.

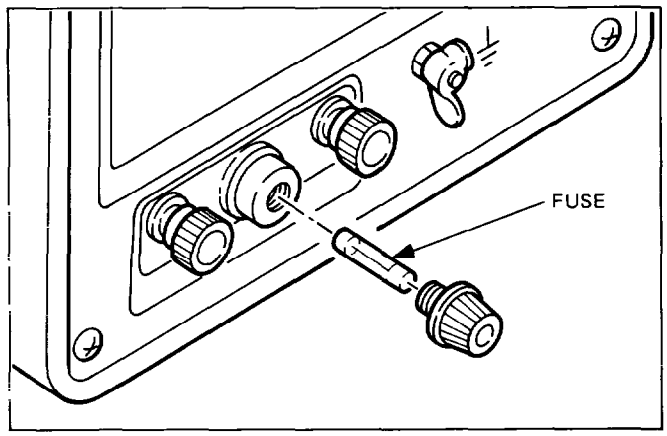


Fig. 11-6

11-4-3 CHECK THE WIRING.

Check all the wires to be connected correctly.

11-4-4 CHECK THE DIODE RECTIFIER.

Remove the control panel and check the diode rectifier with a circuit tester.
Refer to Section 9-7 "DIODE RECTIFIER" for the checking procedure.

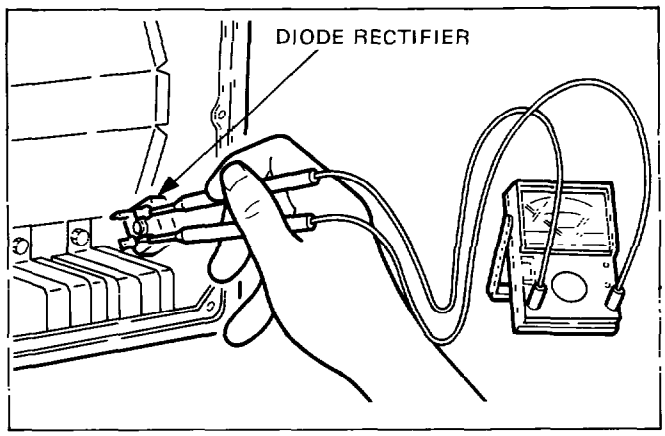


Fig. 11-7

11-4-5 CHECK THE DC COIL

Check the resistance between two brown leads from stator with a circuit tester.

MODEL		SPECIFICATION	RESISTANCE
RGD2500	50Hz	110V, 220V, 240V 110V 220V	0.16Ω
	60Hz	120V 110V 220V, 120V 240V	0.12Ω
RGD3300	50Hz	110V, 220V, 240V 110V 220V	0.14Ω
	60Hz	120V 110V 220V, 120V 240V	0.11Ω

Table 11-3

If the resistance reading is much larger or smaller than the specified value, the DC coil of the stator is faulty. Replace stator with a new one.

11-5 OIL SENSOR TROUBLE SHOOTING

11-5-1 PRINCIPLE OF OPERATION

The oil sensor for diesel engine consists of a pressure switch as a sensor section and a controller section.

The pressure switch detects the drop of oil pressure in the crankcase. When the oil pressure falls down below the predetermined value (0.3 kg/cm^2), turns on the generate a signal to the controller section.

The controller which is powered by the DC coil sets up a delay for a few seconds for detecting signals transmitted during the period.

If more signals than the predetermined number are generated. the controller feeds power to the solenoid which actuates the latch on the control bracket to release the control lever to shut the engine down.

11-5-2 TROUBLE SHOOTING

(1) Check oil level. Fill it up to maximum level if necessary.

(2) Check all wires to be connected properly.
If they possibly have breaks in connection, the sensor will also malfunction.

(3) Checking the solenoid.
Measure the resistance between two leads from solenoid. (See Fig. 11-8.)

NORMAL RESISTANCE
235 ~ 290 Ω

If the resistance is larger or smaller than the above limits, solenoid is defective.
Replace it with a new one.

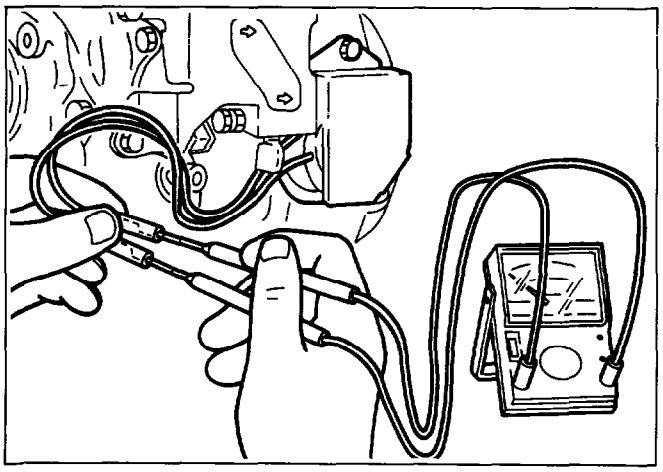


Fig. 11-8

(4) Checking the oil sensor unit

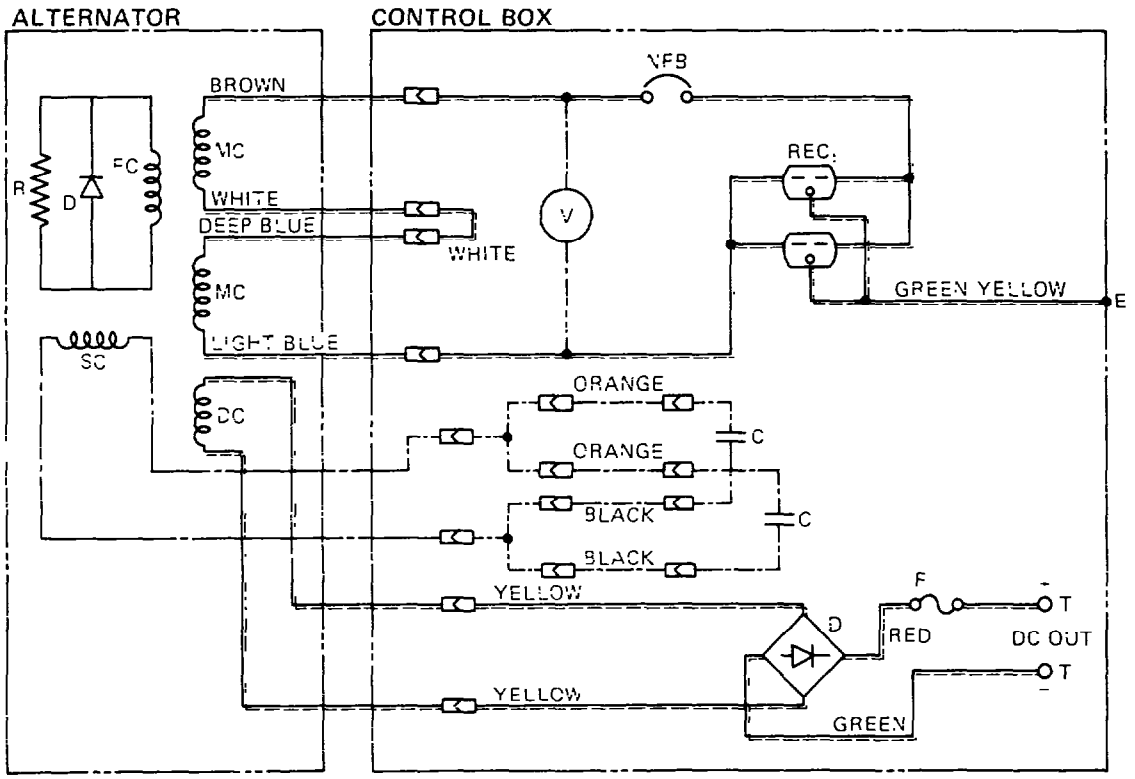
(a) Disconnect the connector on the Black/Yellow lead of the oil sensor unit which is connected to the pressure switch.
(b) Start the engine and ground the Black/Yellow lead of the oil sensor unit to engine body.
(c) If the solenoid actuates to shut the engine down, the oil sensor unit is operating properly.

(5) Checking the pressure switch

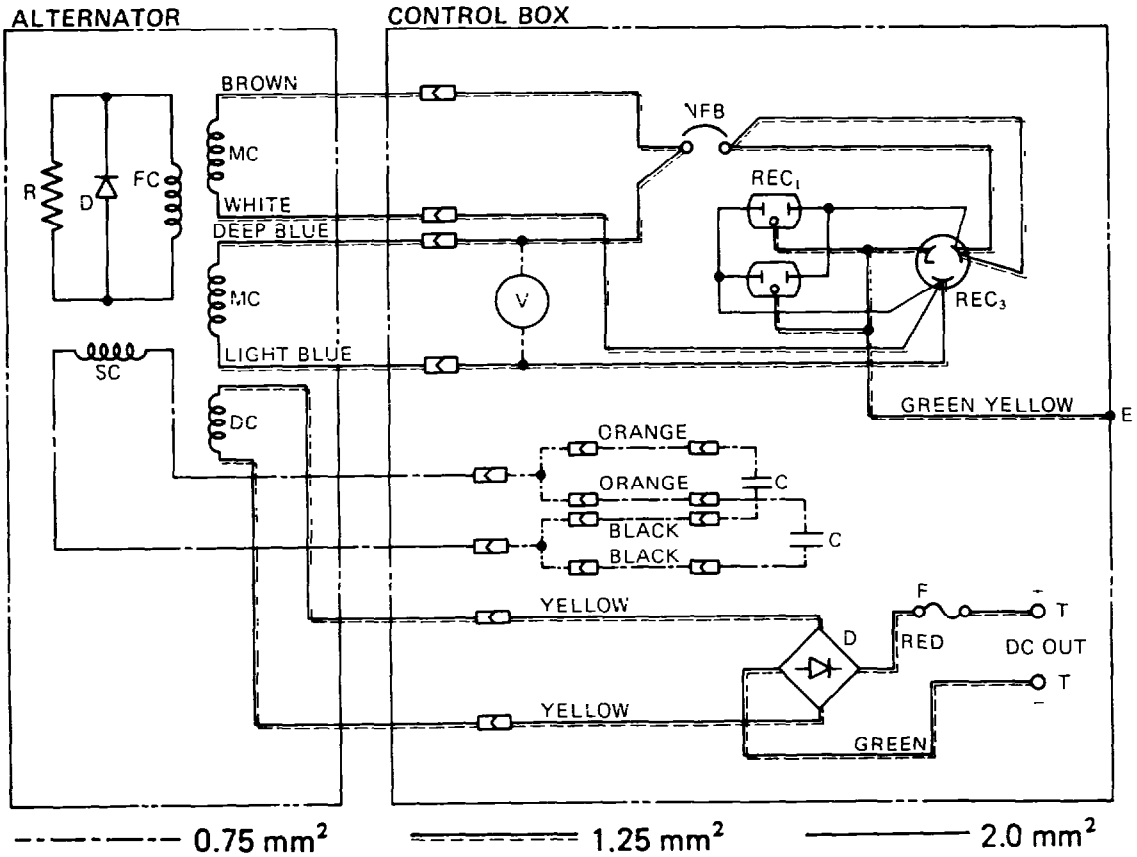
(a) Disconnect the Black/Yellow lead of the pressure switch from the control unit.
(b) Check the resistance between the Black Yellow lead and ground.
Resistance should be ∞ (infinite) when engine is stopped.
(c) Start the engine.
The resistance should be 0 when engine is running.
* The pressure switch actuates at 0.3 kg cm^2 oil pressure.
(d) If the pressure switch does not work properly, replace it with a new one.

12. WIRING DIAGRAM

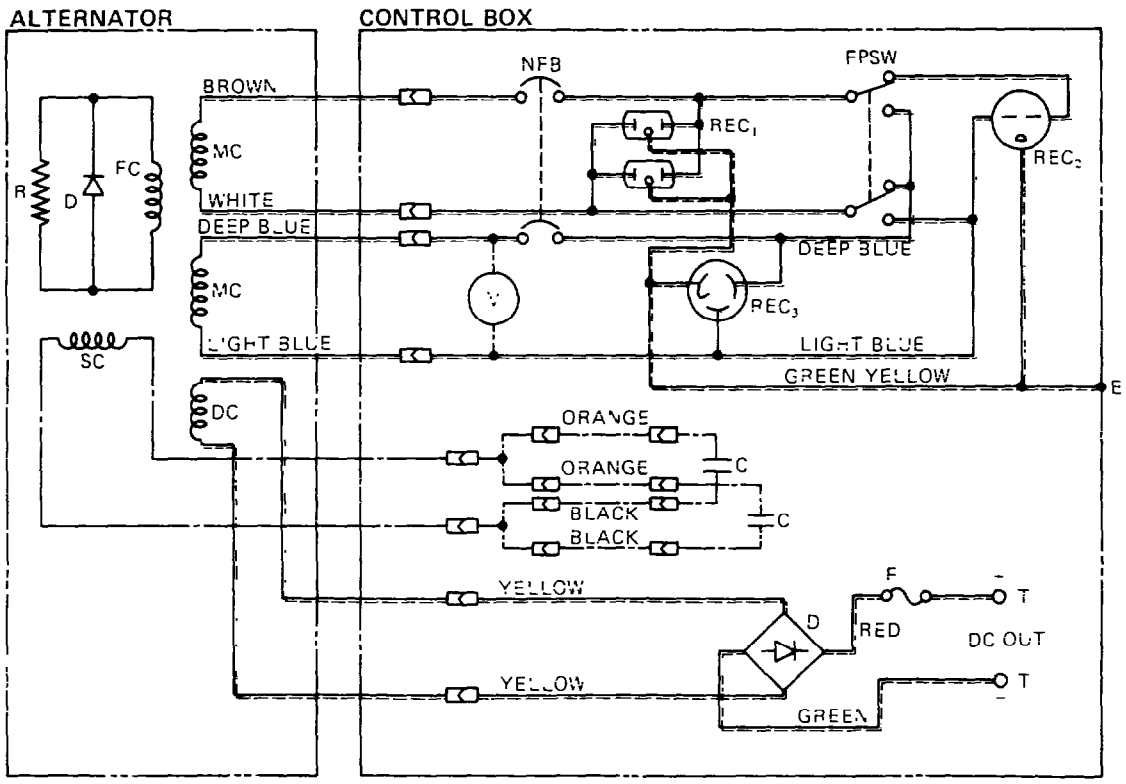
- **RGD2500 : 50Hz-220V, 240V, 60Hz-220V TYPE**



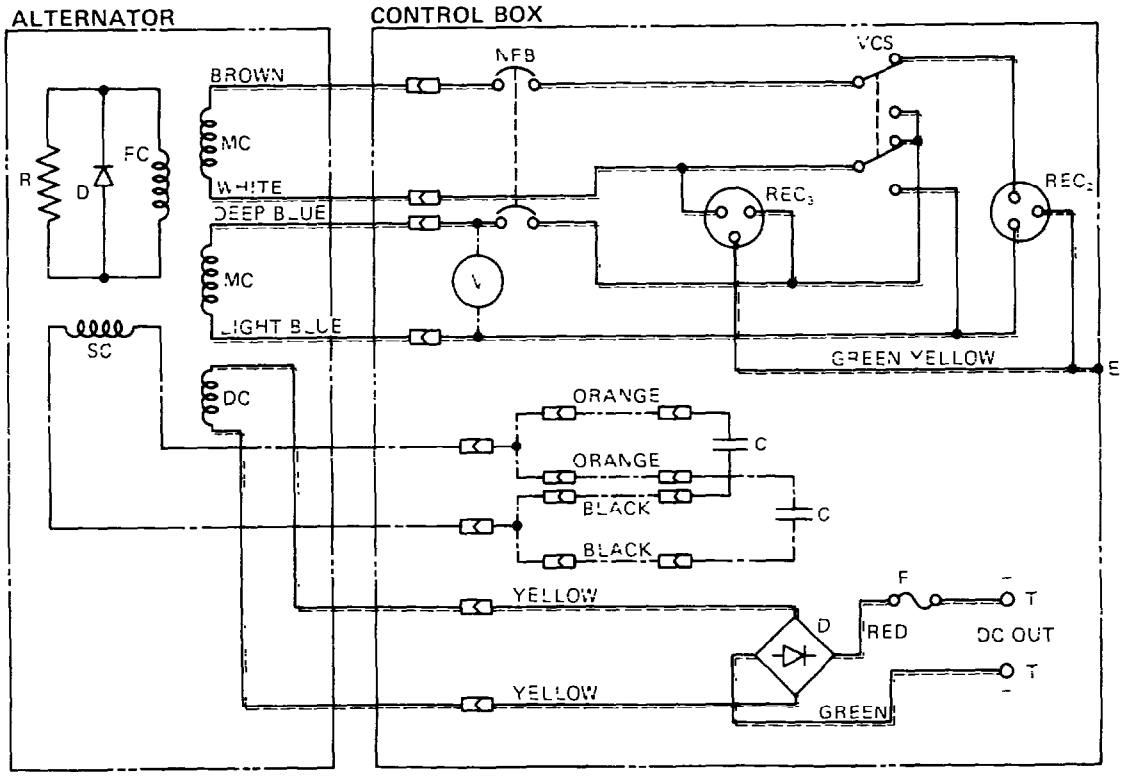
- **RGD2500: 50Hz-110V, 60Hz-110V, 120V TYPE**



- **RGD2500: 50Hz-110V/220V, 60Hz-110V/220V, 120V/240V TYPE**

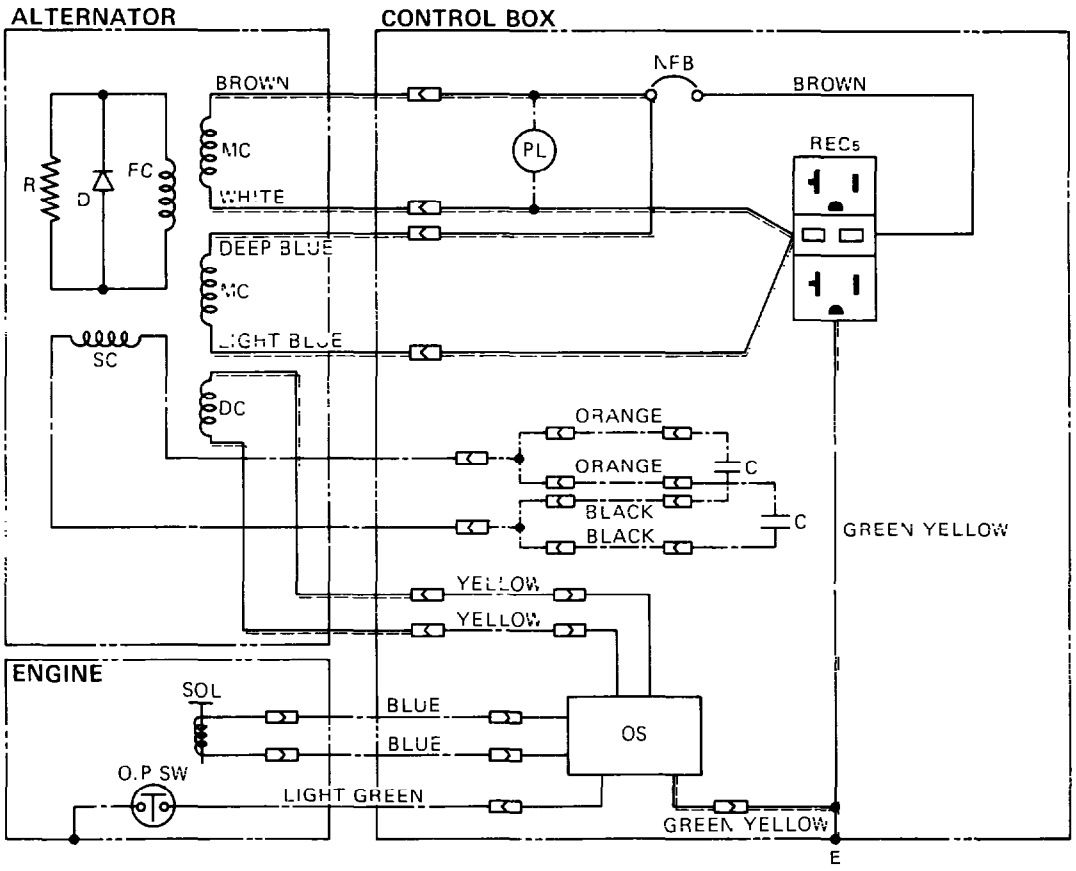


- **RGD2500: U.K., 50Hz-110V/220V [BS RECEPTACLE]**

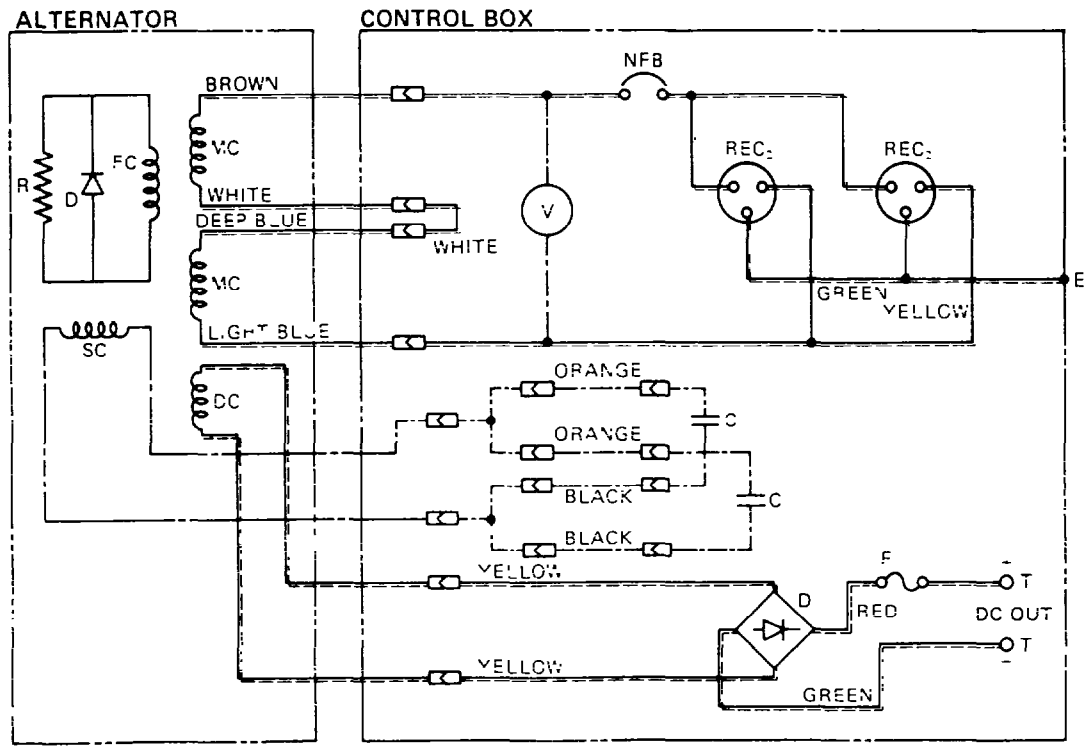


0.75 mm² 1.25 mm² 2.0 mm²

- **RGD2500: U.S.A., 60Hz-120V [NEMA RECEPTACLE]**

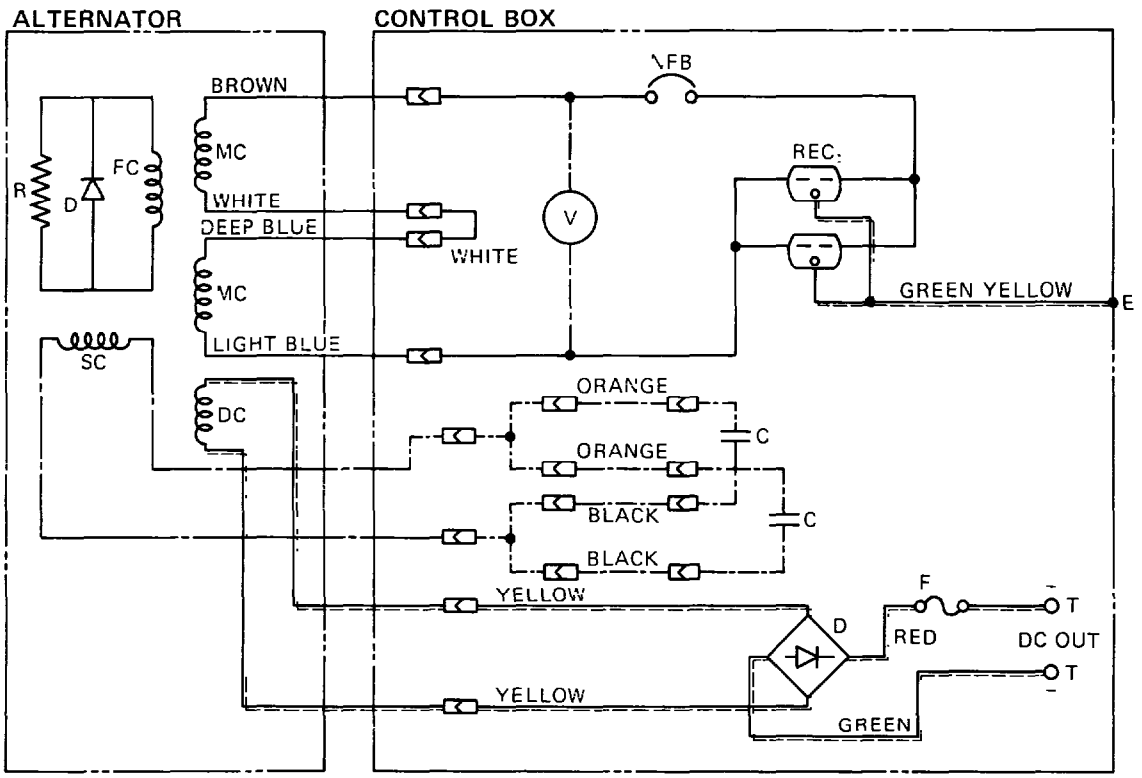


- **RGD2500: 50Hz-220V [FOR EUROPEAN COUNTRIES]**

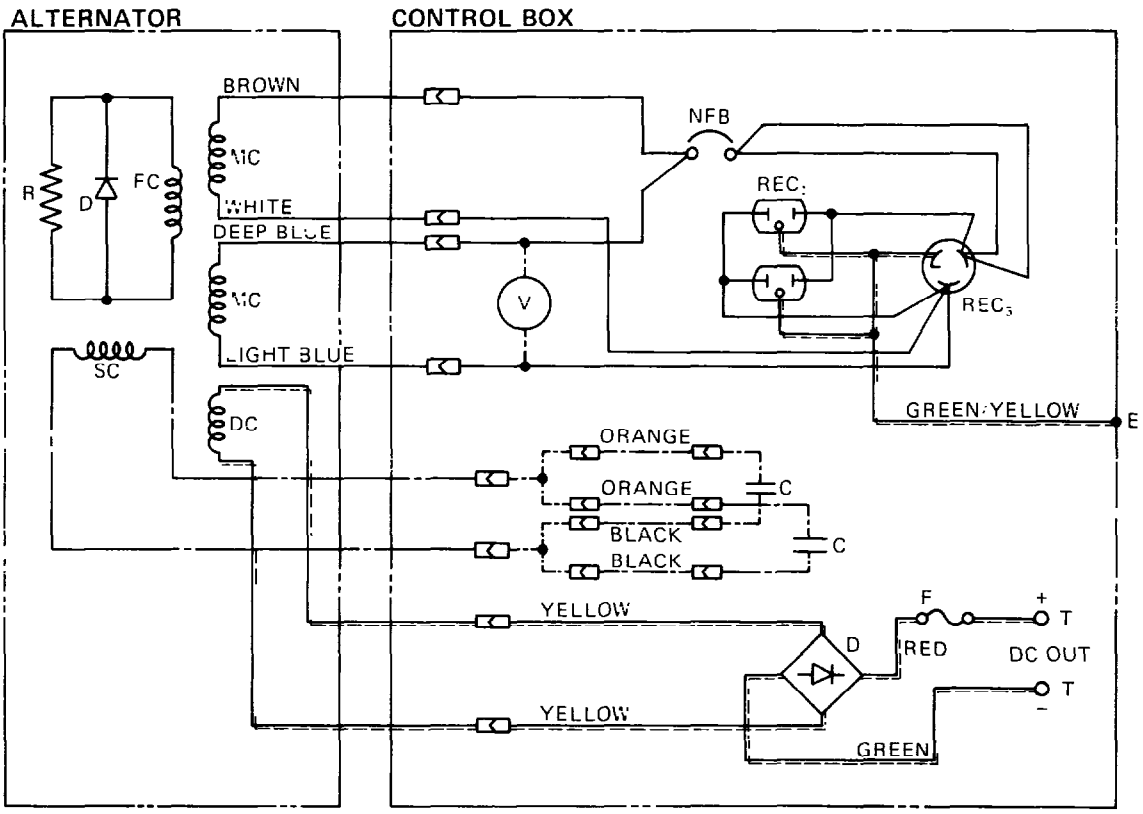


---- 0.75 mm² ═══ 1.25 mm² ——— 2.0 mm²

- **RGD3300: 50Hz-220V, 240V, 60Hz-220V TYPE**

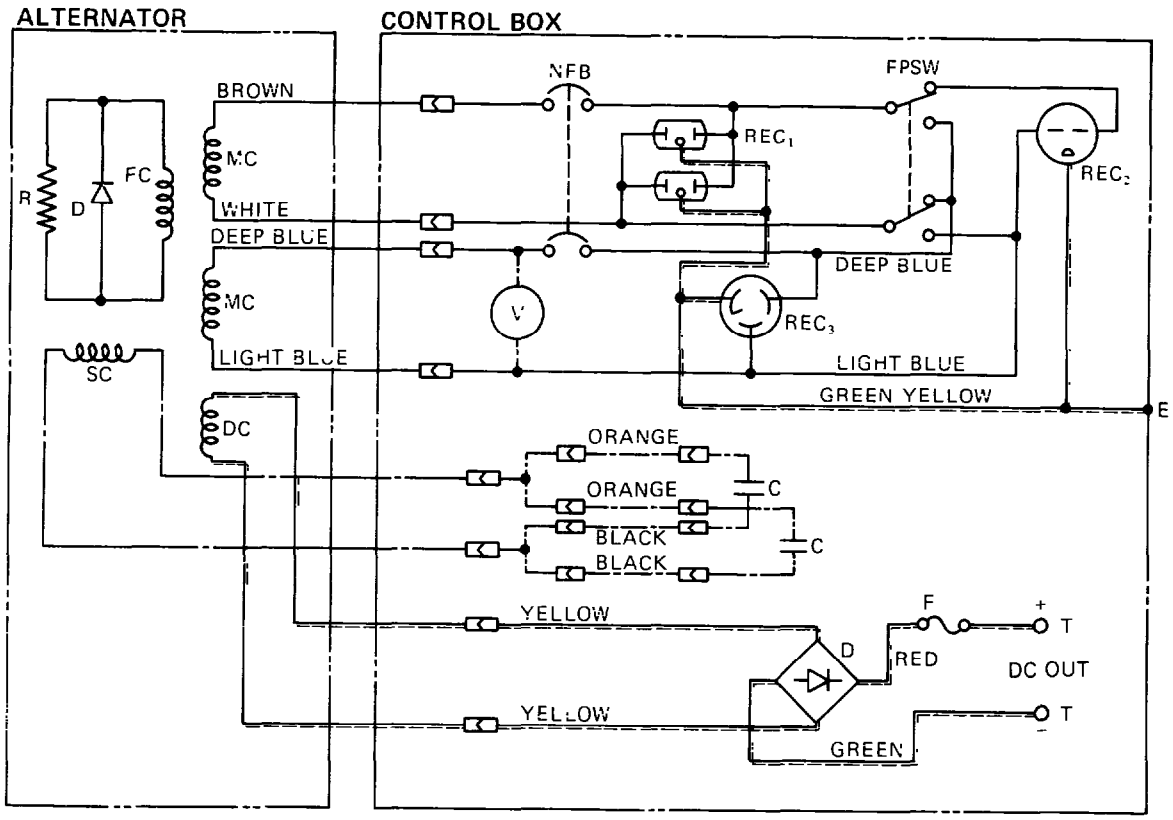


- **RGD3300: 50Hz-110V, 60Hz-110V, 120V TYPE**

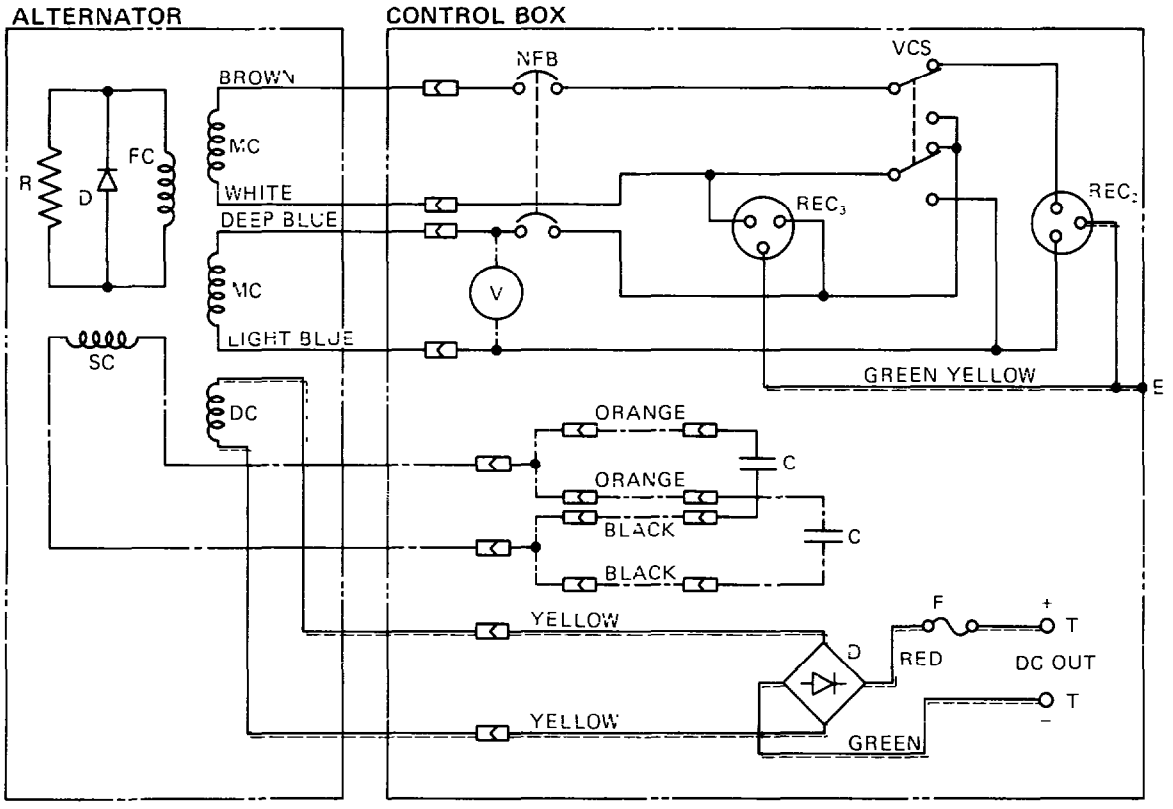


0.75 mm² 1.25 mm² 2.0 mm²

- **RGD3300: 50Hz-110V/220V, 60Hz-110V/220V, 120V/240V TYPE**

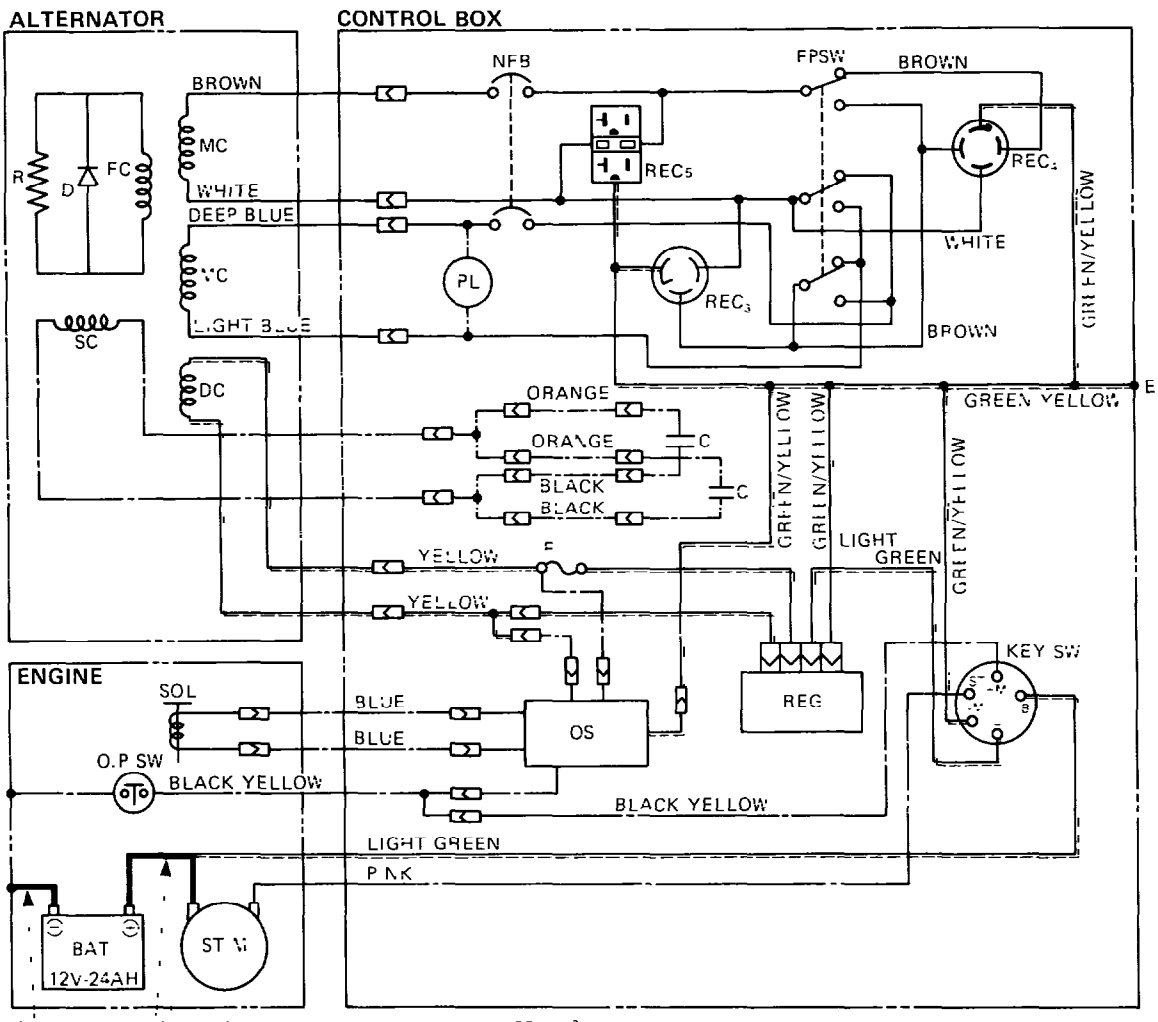


- **RGD3300: U.K., 50Hz-110V/220V [BS RECEPTACLE]**



0.75 mm² 1.25 mm² 2.0 mm²

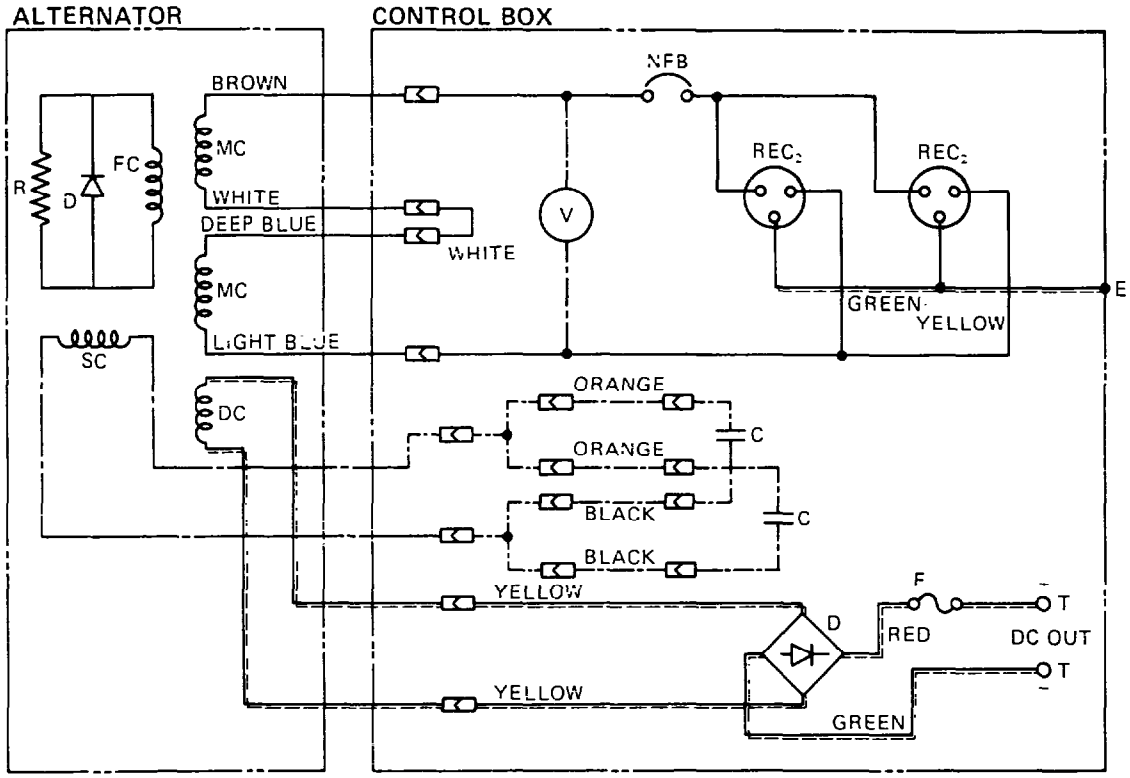
- **RGD3300: U.S.A., 60Hz-120V/240V [NEMA RECEPTACLE]**



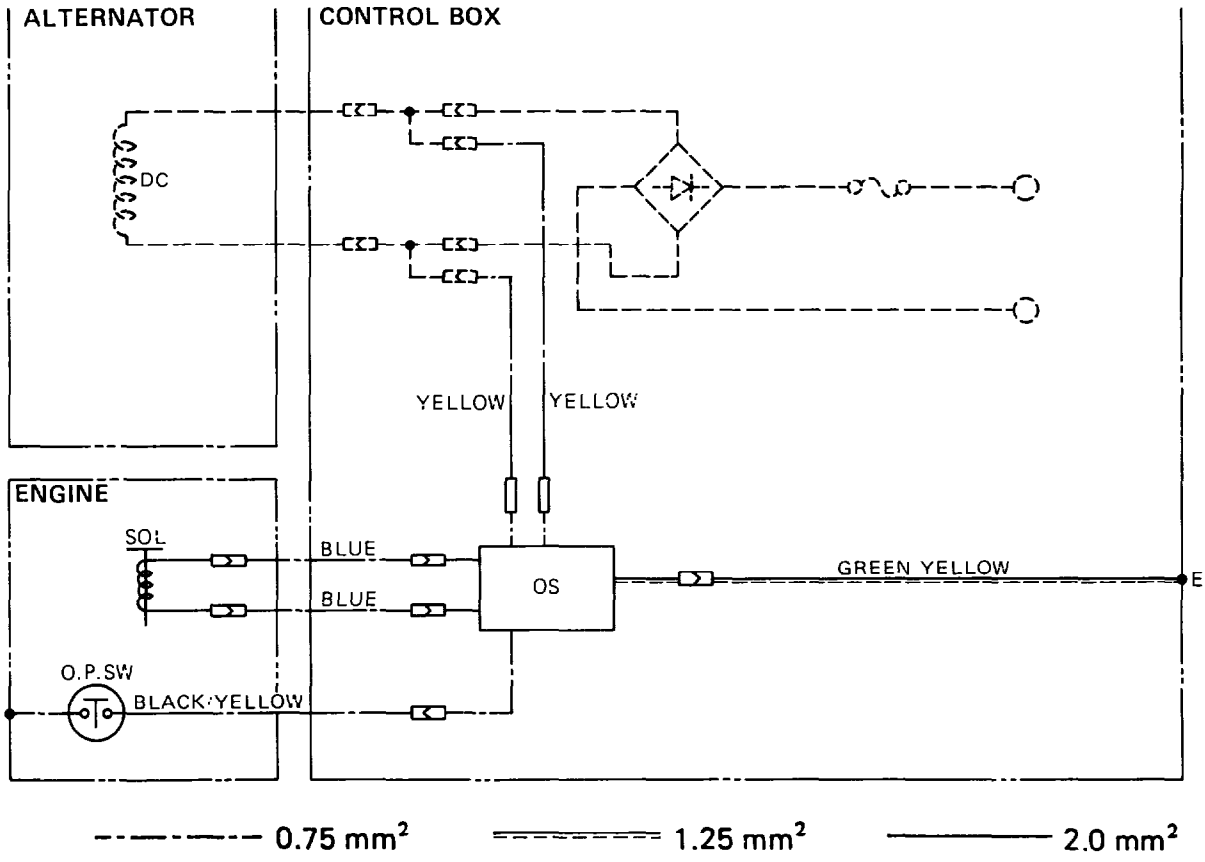
Use the battery cables with a cross sectional area larger than 22 mm².

0.75 mm² 1.25 mm² 2.0 mm²

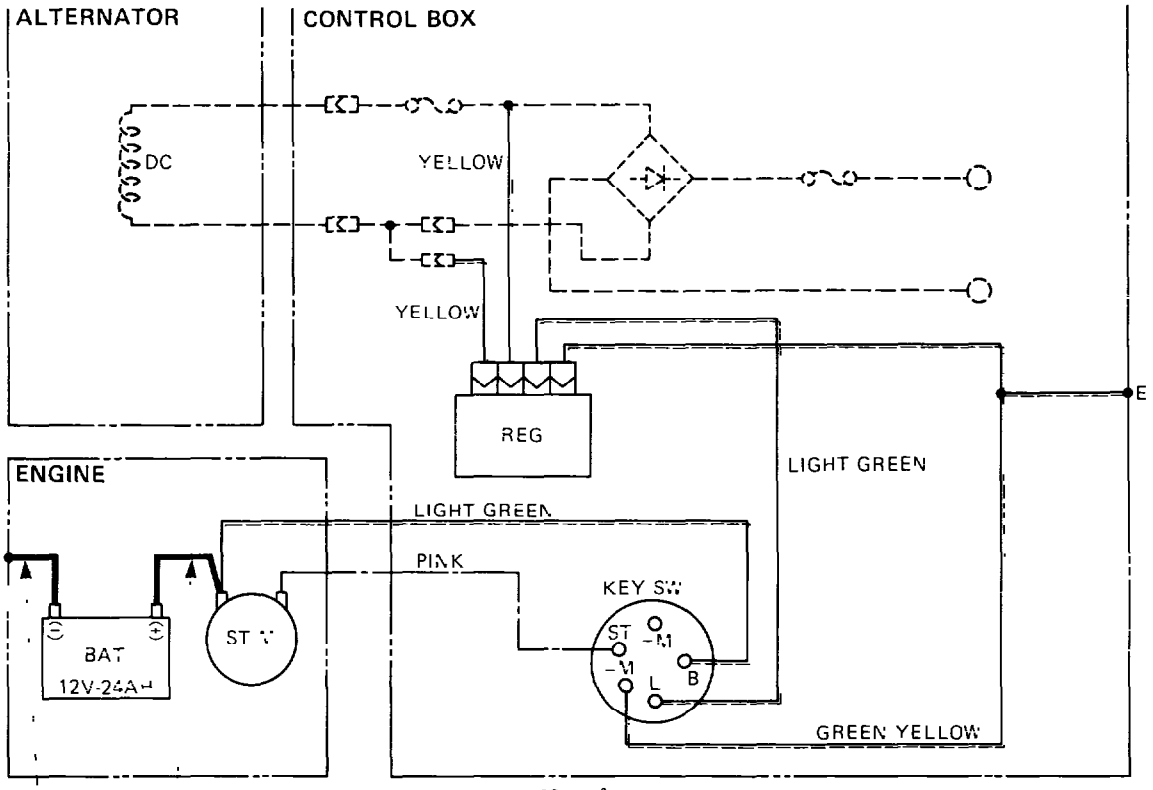
- **RGD3300: 50Hz-220V [FOR EUROPEAN COUNTRIES]**



- **RGD2500, RGD3300: OIL SENSOR SYSTEM (Optional Equipment)**

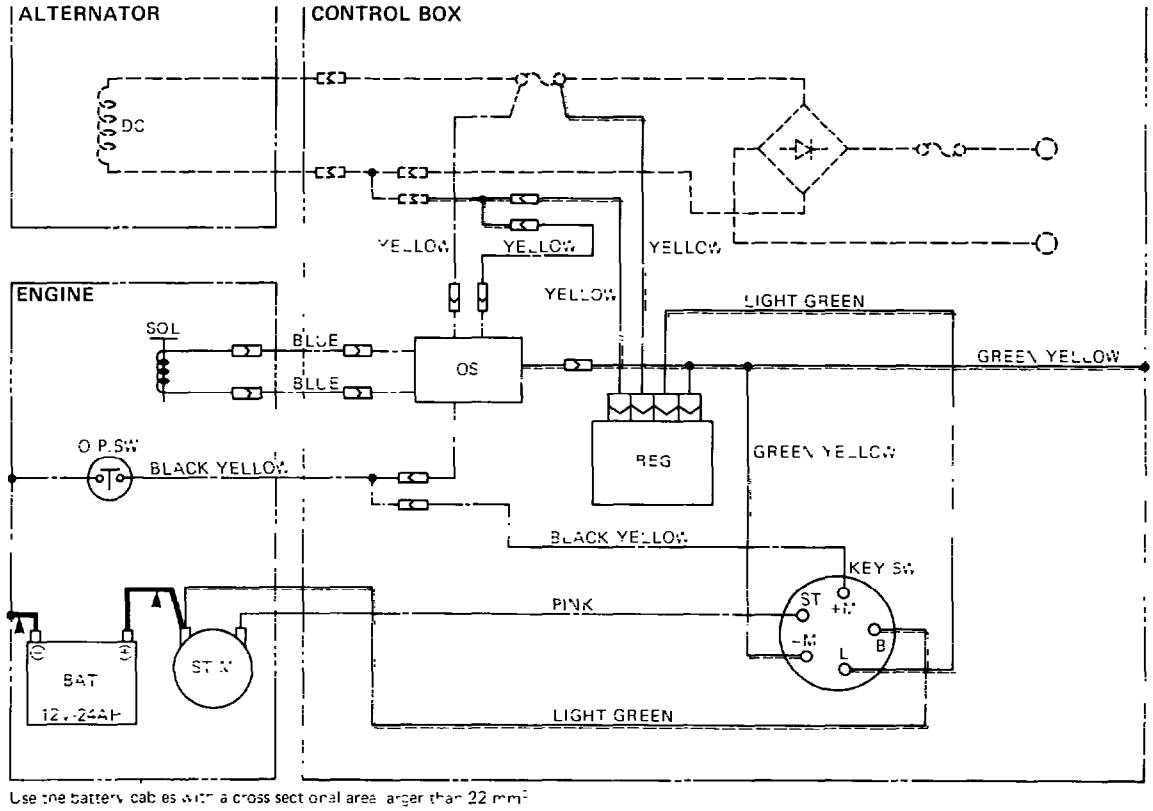


- **RGD2500, RGD3300: ELECTRIC STARTER SYSTEM (Optional Equipment)**



Use the battery cables with a cross sectional area larger than 22 mm².

- **RGD2500, RGD3300: ELECTRIC STARTER AND OIL SENSOR SYSTEM (Optional Equipment)**



Use the battery cables with a cross sectional area larger than 22 mm².

0.75 mm² 1.25 mm² 2.0 mm²

Symbols	Parts Name
MC	AC Winding
SC	Auxiliary Winding
DC	DC Winding
FC	Field Winding
C	Condenser
R	Resistor
D	Diode Stack Assy
V	Voltmeter
PL	Pilot Lamp
T	DC Output Terminal
F	Fuse
NFB	No-Fuse Breaker
FPSW	Full Power Switch
REG	Regulator
OS	Oil Sensor
ST.M	Starting Motor
SOL	Solenoid
KEY.SW	KEY. Switch
O.P.SW	Oil Pressure Switch
BAT	Battery
E	Earth Terminal (Ground Terminal)
VCS	Voltage Changeover Switch
REC_1	AC Output Receptacle (Total 15A MAX.)
REC_2	AC Output Receptacle (220V/240V)
REC_3	AC Output Receptacle (110V/120V)
REC_4	AC Output Receptacle (120V/240V)
REC_5	AC Output Receptacle (Total 20A MAX.)

FUJI HEAVY INDUSTRIES LTD.

Engine & Machinery Export Sales Dept.
39th Floor, Shinjuku Mitsui Bldg.
2-1-1, Nishi-Shinjuku, Shinjuku-ku, Tokyo, Japan
TEL: Tokyo 347-2414–6 TELEX: 232-2401
CABLE ADDRESS: FUJIHEAVY TOKYO

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